RECEIVED
OCT 16
VET. MED. LIBRARY

THE JOURNAL OF THE BRITISH VETERINARY ASSOCIATION

Vet.

The Veterinary Record

v. 69-no 38
Sept 21/57

PATRON: HER MAJESTY THE QUEEN

OHIO STATE UNIVERSITY
OCT 15 1957
LIBRARY

VOL. 69 NO. 38 ISSUE NO. 4144 695 - 916

SEPTEMBER 21st 1957

End Barbiturate Anaesthesia—

within seconds

'Megimide' is the new barbiturate antagonist which dramatically reverses the hypnotic and respiratory depression produced by barbiturates.
Used after barbiturate anæsthesia, it immediately accelerates the return of reflex activity and normal respiration, and is invaluable in effectively lightening barbiturate anæsthesia and shortening the post-operative period of recovery.

Clinical Comments

"In these experiments (with 20 cats and 60 dogs) we have shown that Megimide can be used in veterinary anæsthesia for healthy dogs and cats. Full surgical anæsthesia is immediately terminated, and the animals usually awaken."
(*Vet. Rec.*, 1957, 69, 304.)

"Our experiments showed that Megimide successfully roused these animals (cats) within a matter of minutes. . . . Megimide is a most valuable adjunctive treatment of anæsthetic emergencies, and its use is recommended."
(*Can. Jnl. Comp. Med. and Vet. Science*, 1957, 21, (5), 165.)

'MEGIMIDE'
BEMEGRIDE

The New Barbiturate Antagonist

Literature supplied on request

A. & G. NICHOLAS LTD.

Ethical Pharmaceuticals,
SLOUGH, BUCKS, ENGLAND

The
VETERINARY RECORD

Founded by William Hunting, F.R.C.V.S., in 1888

7, MANSFIELD STREET, PORTLAND PLACE, LONDON, W.1. MUSEUM 6541

No. 38 SEPTEMBER 21st, 1957 Vol. 69

Registered for Transmission as a Newspaper *Price 2s. post free*

Chlorpromazine Sedation in the Pig

BY

H. E. RITCHIE

University of Liverpool Veterinary Field Station, Neston, Wirral, Cheshire

Introduction

DURING recent years reports concerning the use of chlorpromazine hydrochloride in veterinary medicine have related in the main to its use in the horse and dog (Troughton, Gould & Anderson, 1955; Weaver, 1956; Martin & Beck, 1956; Owen & Neal, 1957). The only record of its use in pigs which has been found was a brief mention in a pamphlet issued by the makers*. The purpose of this article is to record the effect upon, and the possible uses of, the drug in that species.

Materials and Methods

Chlorpromazine was administered as a 5 per cent. solution by the intravenous or deep intramuscular route to 30 pigs. For intravenous injection the pigs were restrained by means of a rope snare around the upper jaw, or by the use of Michalik's snout tongs. The majority were of the Large White breed and their weights ranged from 15 to approximately 340 kg. Twenty-seven of them were in good health and condition, two were poor operative risk cases, and one was a suspected case of tetanus.

Results Following the Intravenous Administration

Chlorpromazine was injected intravenously in dosages ranging from 0.55 to 3.3 mg. per kg. bodyweight to 22 pigs in the weight range 15 to 227 kg. No appreciable difference in effect was observed when the injection was made slowly, occupying a time of from 1 to 2 minutes, and when it was administered quickly in from 10 to 20 seconds. In no case was any indication of irritation observed at the site of injection.

General Action

The general pattern of the drug's action was as follows: at the commencement of injection the pig was squealing loudly, but this ceased in the great majority of cases before the injection was completed. On completion of administration the pig was released. Usually it then stood quietly, appearing rather dazed. In almost every case the respiratory rate was increased, this increase commenced within 1 to 2 minutes. Respiration was very rapid and forceful, the rate varying in different animals between 60 to 100 per minute. This type of breathing persisted for several minutes, after which the respiratory rate gradually slowed down and became normal again some 15 minutes later. Meanwhile, the animal was becoming progressively narcotised. It stood quietly with its head held low and its eyelids drooping. The limbs were held widely apart, in a trestle-like stance, with the spine drooped and the tail hanging limply. Slowly the head was further lowered until it touched the ground, and the fore limbs gradually collapsed beneath it. This abnormal posture was maintained for a short time and then the hind limbs also collapsed and the pig became recumbent in the sternal position. If left undisturbed it would pass into what appeared to be a state of deep sleep. From this, however, the pig could usually be aroused by loud noises or vigorous stimuli. When this occurred, it would get up and stagger around the pen, but when interference ceased it very quickly became recumbent and went off to sleep again.

Although the adoption of the abnormal posture occurred in the majority of cases, there were a few in which it did not. In these cases the animal commenced to wander slowly and aimlessly around the pen. There was the gradual onset of an increasing degree of inco-ordination of the hind limbs, the fore limbs were also affected but to a lesser degree. The pig appeared to be restless, often lying down only to get up almost immediately and continue its aimless wandering. During this period movable objects were overturned and the bedding was thrown about. Finally, after some 10 minutes, the pig lay down and passed into a state of deep sleep.

Complete relaxation of the anus occurred in the majority of cases some 3 to 10 minutes after administration. Narcotic excitement either during induction

* Messrs. May and Baker Ltd.

or the recovery, was not a feature of the general pattern of the drug's action. But in contrast to this general pattern, 3 exceptional cases were encountered in one of which excitement was a feature, and in the other two general anaesthesia supervened. Details of these exceptional cases are as follows:—

No. 2127 (September 19th, 1956) Large White Sow—weight 205 kg.

The sow was acutely lame on the right hind leg. The inner digit of this leg had been amputated 7 months previously under pentobarbitone anaesthesia. After suitable restraint 400 mg. of chlorpromazine were slowly injected intravenously, and 15 minutes later the degree of sedation was sufficient to allow an examination of the foot to be made without any restraint. The sow was left sleeping quietly. Four-and-a-half hours later the attendant reported that "he thought the sow was now choking." When examined the sow was recumbent on her right side and making the most violent kicking movements with all 4 limbs. The attendant reported that "previously she had been trying to climb the wall." She had dragged herself into a corner and had commenced to chew and bite the woodwork. Respiration was accelerated—70 per minute; temperature was 101.2° F; the pupils were widely dilated and showed only a very poor and sluggish response to bright light. The anus was normal and normal tone was present in the tail. There was severe bruising around the mouth and eyes. She seemed oblivious of all external stimuli. After 15 minutes she had quietened considerably and was lying quietly, except for continually licking the wall. No treatment was attempted. Six-and-a-half hours after administration the sow was behaving perfectly normally; temperature 101.8° F; respiration normal.

In two cases a state of profound unconsciousness was produced following the intravenous administration of chlorpromazine.

No. 2034 (July 26th, 1956) Large White Gilt—weight 90 kg.

The gilt was acutely lame on the left fore leg, and greatly resented any examination. 250 mg. (2.8 mg. per kg.) of chlorpromazine were quickly injected intravenously. This produced the usual effect on the respiratory rate, and the gradual onset of sedation. Ten minutes later the degree of sedation was such as to enable an examination of the affected leg to be made without restraint. During the next 5 minutes the degree of narcosis deepened until a state of profound unconsciousness, with complete absence of any pedal reflex, existed. This state persisted for a further 10 minutes, after which there was a gradual return to consciousness. However, it was not until 2 hours later that the gilt had sufficiently recovered to be able to stand.

No. 2165 (September 19th, 1956) Large White Sow—weight approximately 180 kg.

Five days previously a digit had been amputated under pentobarbitone anaesthesia. During the night the bandage had been torn off, and to facilitate dressing of the amputation an intravenous injection of 500 mg. of chlorpromazine was commenced. When 100 mg. had been injected in about 20 seconds, her limbs suddenly collapsed in an alarming manner, and she fell to the ground. For some 30 seconds she lay perfectly still and no respiration could be detected. Then she began to make violent kicking movements with all 4 limbs, respiration becoming very forceful and rapid at a rate of 100 per minute. These most alarming signs persisted for 3 minutes and then subsided quickly, the sow passing into a state of profound unconsciousness. Fifteen minutes later she was rapidly gaining consciousness (temperature 101.1° F., heart rate 110, respiratory rate 40), and 5 minutes later, in response to slight stimulation, she immediately rose and walked around the pen with only a slight degree of inco-ordination. Forty minutes later she appeared to be perfectly normal.

Effect upon respiration

As mentioned previously, after intravenous injection chlorpromazine had a marked effect upon respiration. Of the 22 cases involved, in which dosages of 0.55 to 3.3 mg. per kg. were used, a very marked initial increase in the respiratory rate occurred in 19. This increase occurred irrespective of whether the drug was administered slowly or quickly, and its duration did not appear to bear any relationship to the dosage used. In the remaining 3 cases, two of which were sows for caesarean section and the other a 109 kg. boar, doses of 1.5, 3.3 and 2.2 mg. per kg. respectively caused no significant alteration in the rate or character of the breathing.

Effect upon heart rate

For obvious reasons it was most difficult to record the heart rate of the pigs at rest. In only 5 cases was it possible to do so.

Table I shows the type of animal concerned, with its heart rate at rest and the heart rate 5 minutes after administration of chlorpromazine.

TABLE I

HEART RATES BEFORE AND AFTER THE INTRAVENOUS ADMINISTRATION OF CHLORPROMAZINE

Age	Sex	Weight	Heart rate at rest	Dose of chlorpromazine	Heart rate 5 minutes after administration
		kg.		mg./kg.	
6 weeks	F	15	112	3·3	140
7–8 months	M	104	104	2·2	132
7–8 "	M	109	104	2·2	180
7–8 "	M	113	120	2·2	140
1 year	M	133	80	1·9	132

The increase which occurred was maintained for 10 to 15 minutes, after which it gradually returned to the normal resting rate. This increase in heart rate coincided with the period of exaggerated respiration.

Effect upon body temperature

Chlorpromazine alone, in doses of 0.55 to 3.3 mg. per kg. bodyweight, was administered to 7 pigs.

Their initial temperatures ranged between 101.8° and 104.4° F. In 6 cases the rectal temperature fell. This fall commenced some 10 minutes after administration and reached its peak 1½ to 3 hours later; it remained at this level for a further 1 to 2 hours and then gradually returned to normal. In 1 animal, a young sow, the temperature was unaltered throughout. The range of temperature fall was 1.5° to 8° F. and appeared to be unrelated to the unit dosage administered or to the degree of narcosis which ensued.

The drug was used in doses of 1.5 to 3.3 mg. per kg. as a premedicant prior to barbiturate anaesthesia in 15 cases. Prior to the induction of anaesthesia the temperature fell 1° to 2.5° F. in 14 of the cases involved. In the remaining case there was a paradoxical rise of 2° F. On the day following administration, every case showed a body temperature which was within the normal range. It was not thought that the environment of the animals played any significant part in the changes in body temperature which occurred. All were indoors, free from draughts, and ample straw bedding was provided.

Sedation

Sedation has been defined as a mild state of central depression in which the patient, although awake, has a lessened degree of cortical excitability and is therefore more calm and tranquil. In this series of cases the criteria for useful sedation in pigs were:—

1. The intravenous injection of a barbiturate to a depth of general anaesthesia, occupying some 4 to 6 minutes, could be performed without restraint and without resentment on the part of the animal.

2. No restraint was required for the injection of, and the performance of operations under, local anaesthesia, with the exception of injections into the scrotum.

3. The examination of the animal for a lesion causing minor discomfort could be carried out without restraint or resentment by the animal.

Useful sedation, as judged by one or other of the above criteria, was obtained in 20 cases and failed in two (Nos. 4264[1] and 2215). The full sedative effects of the drug were not obtained until some 10 to 15 minutes had elapsed. The duration of sedation varied considerably, but was usually 4 to 6 hours; in every case the animal was normal the following day. In the 2 cases in which sedation was not obtained, the effects of the drug were:—

No. 4264[1] (*June 25th,* 1956) *Large White Boar—91 kg.—Castration*

Three hundred mg. chlorpromazine were injected intravenously in 60 seconds. The boar continued to squeal throughout the injection. Two minutes after completion the respiration became very rapid and forceful (80 per minute), and remained so for 5 minutes before it gradually subsided. Meanwhile slight inco-ordination of the hind limbs had occurred and the boar appeared sleepy, but it was squealing continuously. This state of affairs persisted for 20 minutes during which any attempt to handle the animal produced the most violent struggling. The boar was manually restrained and a further 300 mg. of chlorpromazine were slowly administered over 1½ minutes. The only effect that this had was to cause another bout of very rapid and forceful respiration. Fifteen minutes after this second injection any attempt to handle the animal produced violent and uncontrollable struggling; the animal was now completely unmanageable. The operation was therefore abandoned.

Two hours later the boar was very deeply narcotised and could not be roused to stand. During this time there had been a fall in body temperature from 102.2° to 97.2° F. The total duration of the effect of the chlorpromazine was not known. When observations were discontinued at the eighth hour the boar showed slight inco-ordination of all 4 limbs and had a very sleepy appearance. The following morning he was normal, and easily and quietly castrated under local anaesthesia without using any chlorpromazine.

No. 2215 (*October 18th,* 1956) *Large White Boar—91 kg.—Castration*

Two hundred mg. chlorpromazine were injected intravenously in 20 seconds. The animal continued to squeal throughout the injection. During the first 10 minutes the drug appeared to have little effect, apart from the usual change in respiration. The boar then commenced to wander aimlessly around the pen, showing signs of aggressiveness; all movable objects were overturned and thrown about, other pigs were attacked and it persistently tried to butt the attendants. This continued for 30 minutes, after which the boar appeared to quieten and became recumbent, but when an attempt was made to inject pentobarbitone sodium uncontrollable struggling occurred. Four-and-a-half hours later the boar appeared normal.

The Influence of Chlorpromazine on Pentobarbitone Sodium Anaesthesia

Troughton, Gould and Anderson (1955) have reported chlorpromazine as having a potentiating effect in barbiturate anaesthesia in the dog, while Owen and Neal (1957) have similarly reported a potentiating action in regard to choral hydrate anaesthesia in the horse. In this study an attempt was made to assess the possible potentiating effect of chlorpromazine to pentobarbitone sodium in pigs, but before an assessment could be made it was necessary to know the dosage of pentobarbitone required to produce a standard depth of anaesthesia without premedication. Kernkamp (1939) and Wright (1952) record that marked variations in susceptibility to pentobarbitone occur in the pig. The writer's experience with pentobarbitone shows these variations to be the rule rather than the exception. (See Table II.)

Following premedication with chlorpromazine in doses varying from 1.9 to 3.3 mg. per kg. bodyweight, a standard depth of anaesthesia was induced in 10 cases with pentobarbitone sodium. In each case the recovery period, which varied from 1½ to 10½ hours, was quiet and uneventful. The results are shown in Table III.

From these results, and in view of the great variations of individual susceptibility of the pig to

pentobarbitone sodium, it would seem that any potentiating action that chlorpromazine may have on pentobarbitone sodium anaesthesia is related to the individual animal rather than to the species.

Results following the Deep Intramuscular Administration of Chlorpromazine

Chlorpromazine was administered as a 5 per cent. solution by deep intramuscular administration to 8 pigs whose weights ranged from 49 to approximately 340 kg. in doses varying from 2.0 to 4.4 mg. per kg. bodyweight. No indication of pain or irritation was observed at the injection site. The effects were less marked than when the drug was administered intravenously. No appreciable change in the respiratory rate occurred, neither did the animals adopt abnormal postures nor indulge in the aimless wandering seen following intravenous administration. The effect upon body temperature was only recorded in 3 cases, and in these there was a fall in the range 1.7° to 2.4° F. some 30 to 40 minutes after injection.

Sedation

In 3 cases, with a weight range of from 49 to 113 kg. and a dose range of from 2.2 to 4.4 mg. per kg., the drug had no sedative effect whatsoever. In the remaining 5 cases sedative effects were more difficult to assess, mainly because these animals were heavy adult boars of uncertain dispositions. They had either attacked their attendants or had badly savaged sows during service, and their tusks were to be cut as a precautionary measure. The following brief case records indicate that the results were very satisfactory.

No. C. (November 8th, 1956) Large White Boar—approx. weight 225 kg.—dosage rate 1,000 mg. intramuscularly

Slight swaying of the hindquarters was present after 20 minutes. After 35 minutes the boar had become recumbent and did not respond to stimulation. A jaw snare was easily applied and this did not cause resentment. After 40 minutes pentobarbitone sodium was easily injected intravenously to the point of light anaesthesia, 18 gr. being used. The tucks were cut, using tooth shears, and the stumps were smoothed with a rasp. Recovery was quiet and uneventful, the boar being normal 4 hours later.

No. 2283 (November 21st, 1956) Large White Boar—weight approx. 225 kg.—dosage rate 1,000 mg. intramuscularly

This dose did not produce any visible effect upon the boar, but when he was approached cautiously after 60 minutes, he was found to be docile and showed no resentment when a jaw snare was applied. Light anaesthesia was easily induced by the intravenous injection of pentobarbitone sodium, 36 gr. being used. The recovery period was quiet, but somewhat prolonged, the boar being just able to stand 7½ hours later.

No. 2234 (October 29th, 1956) Large White Boar—weight approx. 300 kg.—dosage rate 1,250 mg. intramuscularly

This dose had no visible effect, and having regard to his size and vicious nature, the jaw snare was applied from outside the pen 1 hour after administration. Once the snare was on, the boar struggled for a few seconds and then became passive. No reaction occurred when the shears were applied and the tusks cut and rasped.

No. 1693 (January 13th, 1956) Landrace Boar—weight approx. 225 kg.—dosage rate 500 mg. intramuscularly

The onset of slight posterior inco-ordination commenced at the 17th minute. From the 35th to 55th minute the boar was recumbent and very quiet. Deep but transient anaesthesia was induced by the rapid intravenous injection, without restraint, of 15 gr. thiopentone sodium. The tusks were then cut.

No. 1990 (July 5th, 1956) Large White Boar—weight approx. 340 kg.—examination for lameness—dosage rate 1,000 mg. intramuscularly

The boar quickly became recumbent, and 20 minutes after administration its reactions to stimulation were extremely sluggish. A jaw snare was easily applied, and examination of the foot commenced, the boar remaining recumbent. However, movement of the leg interfered with detailed examination, and pentobarbitone sodium was administered intravenously; 20 gr. provoking light anaesthesia. A puncture wound of the sole was opened and pus released. The recovery period was quiet and uneventful. Six days later the same procedure was repeated in order to dress the foot, with similar results.

Discussion

The changes observed following the administration of chlorpromazine to pigs are similar in several respects to those reported in the horse and dog. For intravenous administration a dosage of 2.2 mg. per kg. may be injected rapidly with safety. The speed at which an injection may be made is a factor of considerable practical importance in view of the difficulty of restraining a fractious pig adequately. For intramuscular administration a dosage rate of 4.4 mg. per kg. is tentatively suggested, although it is very probable that larger doses could be employed without causing toxic effects. It is advised that whenever practicable the drug should be injected intravenously, because the onset of its action is quicker, more certain, and more profound than when it is given intramuscularly. Nevertheless, in dealing with large vicious animals it is without doubt safer and easier to administer it intramuscularly. These findings, with regard to the route of administration, agree with those of Owen and Neal in horses, although when used as a premedicant in dogs, Weaver reports that the most satisfactory results followed intramuscular administration.

Given intravenously, the drug had a marked stimulating effect upon the respiration in the majority of cases, which coincided with an increased heart-rate. No appreciable alteration in the rate or character of the breathing was observed following intramuscular administration. Respiratory stimula-

tion following intravenous administration is peculiar to the pig and has not been reported as occurring in the other domestic species although, in human volunteers, Dobkin *et al.* (1954) reported that the respiratory rate was often increased and the rhythm irregular.

Considerable attention has been focused on the hypothermic action of the drug. In the pig, this effect was an almost constant feature. The average fall in temperature, which was apparently unrelated to environmental factors or to the degree of sedation (if any) which occurred, was 2° to 3° F. In one

TABLE II

DOSAGE OF PENTOBARBITONE SODIUM IN MG. PER KG. BODYWEIGHT REQUIRED TO INDUCE ANAESTHESIA TO THE POINT OF LOSS OF THE PEDAL REFLEX

Weight of pigs (kg.)	Number of cases	56 mg.	47	35	28	24	20	18	14	13	12	9
0–24	7	×	×	×	×	×						
					×	×						
25–49	6		×				×					
			×•			×	×			×		
49–74	1											×
75–99	5								×			
				×					×		×	×
100–124	1					×						
125–149	0											
150–174	1					×						
175–199 approx.	5		×						×			
			×		×				×			
200–225 approx.	2											×
												×
												–

× = an individual case • = died of respiratory failure

TABLE III

Case No.	Weight of pig (kg.)	Dosage of chlorpromazine in mg. per kg. liveweight	Route of administration of chlorpromazine	Sedation	Time after administration of chlorpromazine at which anaesthesia was induced	Dosage of pentobarbitone sodium in mg. per kg. bodyweight required to induce anaesthesia to the point of loss of the pedal reflex								
						28 mg.	24	20	18	16	14	13	12	10 . . . 5
1952	15	3·3	Intravenously	Good	16 minutes	×								
2565	89	2·2	„	„	15 „	×								
2237	95	3·3	„	„	30 „									×
2212	104	2·2	„	„	32 „							×		
2214	109	2·2	„	„	30 „		×							
2211	109	2·2	„	„	24 „									×
2213	113	2·2	„	„	42 „		×							
4264	113	3·3	„	„	17 „				×					
4765	113	1·9	„	„	25 „						×			
4651	180 approx.	3·3	„	„	30 „ given during caesarean operation							×		

× = an individual case.

case, a sow, there was a paradoxical rise of 2° F. No explanation can be offered for this, although there have been rare instances of similar paradoxical increases in man. The hypothermic effect of the drug seems to be greater in the pig than in either the horse or the dog. In the horse, in the majority of instances, the fall is less than 1° F. (Martin & Beck, 1956; Owen & Neal, 1957). Weaver did not observe any temperature fall in dogs on the day of administration, although Troughton *et al.* have reported the beneficial use of the drug for cases of heat-stroke in dogs. The writer has had no opportunity to use the drug for this condition in pigs, but its use would appear to be indicated. However, intravenous administration of the drug may be contra-indicated in case it further embarrasses the already embarrassed respiration.

Following intravenous administration, useful sedation usually occurred within 10 to 15 minutes in the majority of instances. The degree of sedation was such as to render the animals docile and to facilitate the performance of operations under local anaesthesia without restraint. Two successful caesarean sections were performed in this manner, although in 1 case severe abdominal straining on handling the uterus necessitated the intravenous injection of pentobarbitone. However, all attempts to castrate young adult boars by this method failed. Any attempt to inject local anaesthetic into the scrotum caused marked resentment, although the animals did not resent being handled elsewhere about the body. A feature of chlorpromazine sedation was that it greatly facilitated the slow intravenous administration of barbiturate anaesthetics; induction was quiet and free from the troublesome headshaking which so frequently occurs, and the superficial ear veins appeared more prominently. In 2 instances, Nos. 2165 and 2034, profound unconsciousness followed intravenous administration. The reason for the drug's remarkable effect in case 2165 is not known. A possible explanation, in view of the drug's known hypotensive action, is that unconsciousness was brought about by a sudden fall in blood pressure. The gradual transition from sedation to deep anaesthesia as in case 2034 has not been reported as occurring in the other species following intravenous administration.

When chlorpromazine is used as a premedicant in the horse and dog there is a reduction in the subsequent dose of anaesthetic required to induce anaesthesia. In the pig, when the drug is used for the same purpose prior to pentobarbitone anaesthesia, in view of the wide range of individual susceptibility to pentobarbitone, any potentiating action of chlorpromazine is related to the individual animal rather than to the species as a whole.

Chlorpromazine was administered intramuscularly to several large and vicious adult boars with successful results. Although no outward sign of the drug's effect were to be seen in some instances, they were all, especially in view of their past histories of vicious behaviour, docile when approached.

In conclusion, notwithstanding the failures reported, the drug appears to have a useful part to play in pig practice.

(*Concluded at foot of adjoining column*)

Gamma Radiography in Veterinary Practice

BY

L. COLLERY

Veterinary College of Ireland, Ballsbridge, Dublin

IN a paper published about a year ago the present writer suggested that certain of the gamma emitters now available might prove useful in radiology as an alternative to the conventional X-ray plant, portable or otherwise. Radiology is at times almost a necessity in modern veterinary practice, but the cost and upkeep of a machine is not always justified by the volume of work in any given practice. Some of the radioactive gamma sources on the market at present are reasonably priced, and the range of these is likely to increase, and their price fall as unwanted fission products are processed for the market. Not all gamma emitters will prove suitable for veterinary radiography, but enough are already available to make this field of interest to veterinarians.

Technical Information

Physical data quoted here are in accordance with the official data sheets published by the Atomic Energy Research Establishment. To be effective for the purpose stated above, any gamma source must meet the following requirements:—

1. Portability.
2. Availability.
3. Reasonable cost.
4. Reasonable shielding requirements.
5. Favourable comparison in results with conventional X-ray units.

Purely from the point of view of results, cobalt 60 most closely approximates conventional roentgenology. It has already established its position both

(*Continued on page* 901)

Summary

Chlorpromazine hydrochloride, as a 5 per cent. solution, was administered either by the intravenous or the deep intramuscular route to 30 pigs. The effects which were observed are recorded and discussed.

Acknowledgments.—The author is indebted to Professor J. G. Wright for his interest and advice; to Mr. P. J. N. Pinsent for permission to include case 1990, and to Mr. M. Botting for his assistance in handling most of the animals.

References

DOBKIN, A. B., GILBERT, R. G. B., & LAMOUREUX, H. (1954). *Anaesthesia.* **9.** 157.
GRAHAM, E. M. (1956). *M. & B. Review.* **8.** 3.
KERNKAMP, H. C. (1939). *J. Amer. Vet. Med. Ass.* **94.** 207.
MARTIN, J. E., & BECK, J. D. (1956). *Amer. J. Vet. Res.* **17.** 678.
OWEN, L. N., & NEAL, P. A. (1957). *Vet. Rec.* **69.** 413.
TROUGHTON, SYBIL E., GOULD, G. N., & ANDERSON, J. A. (1955). *Ibid.* **67.** 903.
WEAVER, BARBARA M. (1956). *Ibid.* **68.** 347.
WRIGHT, J. G. (1952). "Veterinary Anaesthesia." 3rd ed. 203. Baillière, Tindall & Cox.

for radiography and radiotherapy in medical practice. Its high shielding requirements make it at the present time unsuitable for veterinary practice.

Iridium 162 has an established place in metallurgy. It fulfils the first four criteria set out above. It was tried extensively in the present study at activities of approximately 75 and 150 mc. Tissue radiography with this substance was possible, but the contrast obtained was poor. It is possible that with suitable intensifying screens contrast with iridium radiography may improve. Should this happen, its low price and relatively low shielding requirements will make it well worth an extended trial.

Thulium 170 has already been favourably commented upon by several writers (Mayneord, Hasterlik, Untermager, West). It was tried in the present study with relatively favourable results as detailed below. The source used was in the form of a 2 × 2 mm. capsule with an activity of 348 mc. This is the greatest activity so far made available from Harwell, though there is reason to believe that activities up to 1 C.,* already available in the U.S.A., will soon be on the market here.

For use in the present work the thulium capsule was embedded in a lead cylinder, in which it was slightly countersunk to minimise scattering of radiation. This cylinder had a wire handle for carrying and provided 1 inch of lead all round the thulium. With such shielding the health hazard is negligible, and considerably less than from many of the X-ray units now in use in veterinary practices. The weight is less than 2 lb. A retort stand is used for positioning. Such an arrangement could be greatly improved upon at reasonable cost.

Experimental Work

Both non-screen (Kodirex) and Blue Band Kodak with a Kodak Ultra Speed screen were used. The latter gave the best results. Optimum focal distances with thulium were found to be 7½ to 10 cm., which is much shorter than with an X-ray unit. The accompanying radiographs show the type of result obtained. The legends give the exposure times and focal distances. It is clear that for such things as teeth and limbs of small animals, results compare not too unfavourably with those obtained by conventional radiography. The length of exposure needed for limb bones varied up to about a minute. Many animals will remain sufficiently quiet for such a period with very little restraint. With others resort had to be had to intravenous anaesthesia. This is a slight disadvantage, but one not entirely unknown even with conventional radiography.

Satisfactory radiography was not obtained with live horses. A plate is included which was taken from the limb of a horse which had just been destroyed. The same could, of course, have been obtained with general anaesthesia, but such a course would rarely be justified in practice. The plate is sufficient to show that radiography is possible in large animals with thulium 170. If a frame were constructed whereby the cassette and source could be attached to the limb, the slight swaying movement of the limb of a standing animal would not seriously affect the quality of the resulting picture. This would make gamma-ray photography possible in large as well as small animals.

* C = curie, the standard measure of radiation intensity, and is the quantity of any radioactive material giving 3.70×10^{10} disintegrations per second.

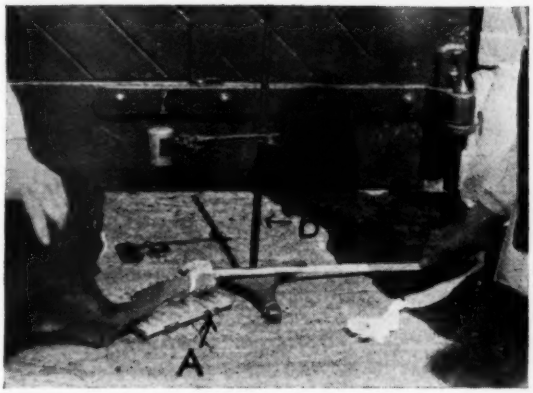

FIG. 1.—The Apparatus.

A = X-ray Cassette.

B = Retort Stand.

C = Lead Block containing radioactive source. Source is exposed by movement of lead cap at lower end of block. Cap is not shown in picture.

Mayneord, writing in 1952, stated, " . . . preliminary calculations show that radioactive isotopes are unlikely to compete seriously with classical radiographic techniques . . . " Likewise, Untermayer, writing in 1954, expresses a similar opinion. Both these writers are almost certainly correct. It is difficult to see the great range and flexibility of the modern conventional X-ray unit being superseded by any isotope. But neither of these writers had veterinary radiography in mind, and, since Mayneord's paper quoted above, the position has altered considerably in favour of thulium 170.

Discussion

The accompanying plates will probably make it clear that thulium 170 as a gamma source for veterinary radiography has distinct possibilities. When stronger sources become available the uses of this substance for radiography will greatly extend. When the source is shielded up to the stringent A.E.R.E. requirements, it is still " portable " in a sense in which the most portable X-ray unit up to the present time has never been. Electric current is not necessary for its use. It has no tubes, and virtually no moving parts to go out of order.

The thulium source referred to above cost £39. Fourteen pounds was refunded when the source was returned some months later, leaving the net cost as £25. The half life of Tm.170 is 129 days or approximately 6 months. Its period of functional usefulness for small-animal radiography would probably be about a year, although at increasing exposure times towards the end of that period. At present prices, therefore, the actual saving over a period of 10 years would

(*Concluded at foot of col. 1, page 902*)

The Use of Barium Sulphate Capsules in the Diagnosis of Oesophageal Obstruction

BY
J. R. HOLT
Chorley

FOR examination of the oesophagus several methods are available to us: (1) endoscopy with the Chevalier Jackson type of endoscope; (2) straight radiography and (3) radiography using liquid contrast media. These methods all have certain disadvantages: endoscopy requires the use of anaesthesia with its attendant risks, but it does permit direct visualisation of the oesophagus and any contained foreign body. Straight radiography will reveal radio opaque foreign bodies but may miss non-opaque bodies and strictures, while radiography with liquid or powdered contrast media may obscure some foreign bodies and does not always show strictures very well.

It was felt that the oral administration of gelatin capsules filled with barium sulphate would provide an alternative method of confirming, by radiograph or fluoroscopy, the presence or absence of an oesophageal blockage.

It has the advantage that it is safe, simple to give, and, should time or expense be salient factors in the case, fluoroscopy will be found quite adequate to localise the position of the capsule after it has been swallowed. If the capsules reach the stomach it is unlikely that there is any obstruction.

The other methods may be used in addition if required.

The following cases demonstrate the use of such capsules in the diagnosis of oesophageal obstruction.

The capsules used in all three cases were of gelatin and contained 5 grains of barium sulphate. Larger or smaller capsules may be used as the case may require.

Case 1.

A black male cat aged 18 months which was reported to be unable to swallow solid food in spite of apparent hunger. Fluids were retained.

Examination of the mouth was negative and no abnormality of the neck or abdomen was felt on palpation.

A barium capsule was administered and a radiograph taken immediately showed that the capsule had been held up at the entrance to the thorax. (See plate facing page 903).

A tentative diagnosis of oesophageal stenosis was made and the cat was destroyed at the owner's request.

On *post-mortem* it was found that there was a band of cicatricial tissue round the oesophagus at the entrance into the chest with a very small apperture only remaining.

Case 2.

A male boxer aged 12 months brought for examination because of profuse salivation, anorexia and unproductive attempts to vomit over a period of a week.

Examination of the neck and abdomen was negative.

Two barium capsules were administered and the dog was examined under a fluorescent screen. Both capsules appeared to be held up in the chest just anterior to a large dark mass.

Under pentobarbitone sodium the stomach was opened and by means of long forceps a portion of cows rib 6 inches long by 2 inches wide was removed from the thoracic portion of the oesophagus.

Case 3.

A six-year old female cat reported to have had a litter of kittens 14 days previously. It was now unable to swallow and vomiting.

The owner was convinced it had an oesophageal obstruction.

Palpation revealed a large mass in the abdomen resembling a kitten, the cat was toxic and dehydrated but the owner was still not satisfied.

A barium capsule was administered and a radiograph taken which revealed the capsule in the stomach and the presence of a single foetus.

Following ovariohysterectomy the cat made an uneventful recovery.

Summary

Three cases are described in which capsules containing barium sulphate were used in the diagnosis of suspected oesophageal obstruction.

Gamma Radiography in Veterinary Practice.—*Concluded.*

not be very great. The initial cost, however, offers a clear advantage over an X-ray unit, and the true portability and mechanical simplicity of Tm.170 must also be taken into consideration.

Thulium 170 is at present in short supply, but the history of radioactive isotopes suggests that the prices of the stable and radioactive element may fall quite substantially in the near future. In such a case it will be a very attractive proposition to veterinarians requiring roentgenographs in their practice, but unwilling to purchase a costly X-ray unit. The possibility must also be borne in mind that iridium 192, which is much cheaper than thulium, or some of the other radioactive substances in easy supply, will, in the near future, prove suitable for tissue radiography.

Summary

The suitability of certain radioactive substances Ir.192 and Tm.170 for gamma radiography in veterinary practice is discussed. A study involving the use of thulium 170 as such a source is described. Suitable exposure times and focal distances are suggested, technical difficulties discussed, and a simple gamma radiography apparatus illustrated. Radiographs taken with this thulium source are presented. Costs of such an apparatus are quoted.

References

COLLERY, L. (1956). *Irish Vet. J.* **10.** 150.
HASTERLIK, R. J. (1954). *Nucleonics* V12, No. 5.
MAYNEORD, W. V. (1952). *Lancet.* **1.** 276.
———. "Radioactive Isotopes in Medicine." Proceedings, Internat. Conference, Geneva 1955. V10. 209.
UNTERMAYER, S. (1954). *Nucleonics.* **12.** 5.
WEST, R. (1951). *Ibid.* **9.** 76.
———. (1953). *Ibid.* **11.** 20.

FIG. 2.—Hock of dog, approximately 40 lb. bodyweight; 10 cm. source-film distance, ½-minute exposure, Tm.170, 348 mc.

FIG. 3.—Carpus of dead horse, 20 cm. source-film distance, 2-minute exposure, Tm.170, 348 mc.

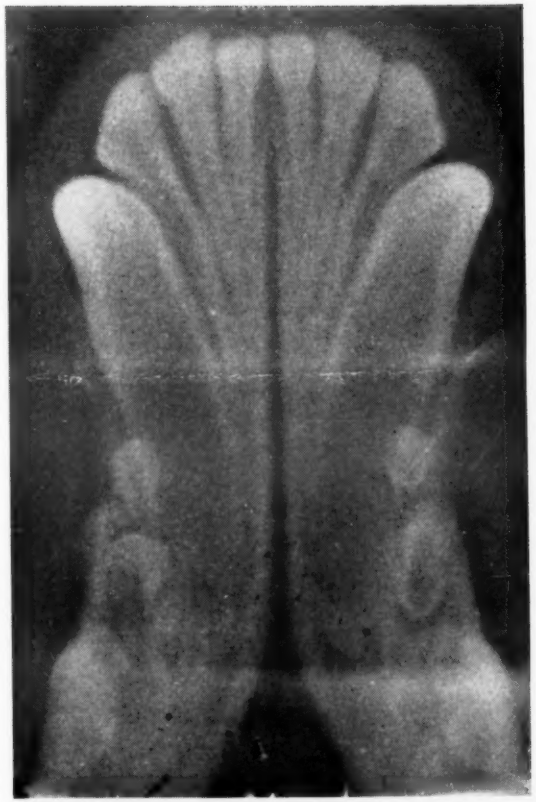

FIG. 4.—Lower jaw, King Charles Spaniel (anaesthetised); 7 cm. source-film distance, 4-minute exposure, Tm.170, 348 mc.

J. R. HOLT.—THE USE OF BARIUM SULPHATE CAPSULES IN THE DIAGNOSIS OF OESOPHAGEAL OBSTRUCTION

The barium capsule can be seen quite plainly at the entrance to the thorax.

The Incidence of Canine Leptospirosis in Glasgow

BY
M. P. CUNNINGHAM and W. I. M. McINTYRE
University of Glasgow Veterinary School
AND
J. C. J. IVES,
Royal Infirmary, Glasgow
With technical assistance of
Miss H. G. G. MATEER

Introduction

LEPTOSPIRA CANICOLA and *Leptospira icterohaemorrhagiae* were first differentiated serologically by Klarenbeek and Schuffner (1933). Since then many surveys based on the serological test described by these authors have been carried out in various parts of the world. These are summarised in Table I.

The present survey was carried out to determine the incidence of leptospiral infection in dogs attending a small-animal clinic in Glasgow.

The literature on leptospirosis in dogs has already been adequately reviewed: Stuart (1946), Broom and MacIntyre (1948), Mills (1948), McIntyre and Stuart (1949), Joshua and Broom (1949).

Materials and Methods

1. *Selection of Dogs.* The 197 dogs used in this survey are a random sample from dogs attending a small-animal clinic in Glasgow between February and July, 1955. On the days during which one of us was at the clinic, all dogs seen for the first time were sampled irrespective of age, breed and sex. After the survey was completed the age, sex and breed of another 1,000 dogs was recorded and the figures obtained compared almost exactly with those in the survey. The clinical diagnoses made on the survey animals were recorded.

2. *Collection of samples.* Freshly sterilised syringes, needles, gum elastic catheters and sterile glassware were used for collection of blood and urine. Blood was withdrawn from the jugular vein in small dogs and from the cephalic vein in larger dogs. Four ml. clotted blood for serology and 1 ml. blood for urea estimations were taken from each dog. Potassium oxalate was used as an anticoagulant in the blood for urea estimations. Urine was obtained from 98 animals by catheterisation.

3. *Blood urea estimation.* The method used was that described by King (1947).

4. *Urine.* The protein content was estimated by precipitation with salicylsulphonic acid and the turbidity was measured visually against a set of standards (King, 1947). The deposit was examined after centrifugation at 2,000 r.p.m. for 5 minutes. Dark ground illumination was used in examining urine for leptospirae.

5. *Serology.* All samples of serum were examined for antibiodies by the agglutination-lysis test of Schuffner (Wolff, 1954) using living 4-day-old strains of *L. icterohaemorrhagiae* (Wijnberg) and *L. canicola* (Aldgate) grown in Stuart's medium (Stuart, 1946).

Results

In Table II are given the detailed serological results obtained from this survey; these are classified according to age and sex incidence.

From this table it will be seen that of 197 animals

TABLE I
SUMMARY OF SURVEYS

Author	Place	Year	Number in series	% Total infection	% L.C.	% L.I.	L.C. : L.I.
Uhlenhuth & Zimmermann	Antwerp ...	1936	90	15–20	—	—	2 : 1
Petersen & Jacobsen ...	Danish Village	1937	53	38·0	2·0	36·0	1 : 18
Bessemans *et al.*	Ghent ...	1938	68	1·0	—	1·0	—
Van der Walle	Antwerp ...	1939	100	44·0	29·0	15·0	2 : 1
Meyer *et al.*	New York ...	1939	111	12·0	9·0	3·0	3 : 1
Babudieri & Castagnoli ...	Rome ...	1940	159	36·0	3·0	33·0	1 : 11
Raven	Pennsylvania...	1940	105	33·3	24·8	8·5	3 : 1
Greene	California ...	1941	368	28·5	28·5	—	—
De Azevedo	Lisbon ...	1943	125	18·0	13·0	5·0	2·5 : 1
Alicata & Breaks	Honolulu ...	1943	100	39·0	19·0	20·0	1 : 1
Savino & Rennella... ...	Buenos Aires	1944	390	25·3	25·0	0·3	80 : 1
Newman	Michigan ...	1947	500	29·0	27·0	2·0	13 : 1
Stuart	Glasgow ...	1946	100	44·0	40·0	4·0	10 : 1
Broom & MacIntyre ...	England ...	1948	403	27·0	21·3	2·2	10 : 1
Mills	" ...	1948	11	45·5	36·4	9·1	4 : 1
Joshua & Broom	" ...	1949	121	38·0	27·0	8·3	3 : 1
" "	N. London ...	1949	100	43·0	31·0	8·0	4 : 1
Davies	England ...	1955	70	2·8	2·8	—	—

L.C. = Infected with *L. canicola.* L.I. = Infected with *L. icterohaemorrhagiae.*

examined, 57 (28.9 per cent.) had positive titres to *L. canicola* and 12 (6.1 per cent.) had positive titres to *L. icterohaemorrhagiae*. Four had the same titres to both.

Age incidence. Table II shows the age incidence in detail for males, females and both sexes respectively. In each age group actual numbers and percentages of animals having positive leptospiral titres are given. The graph in Fig. 1 shows the actual numbers of *L. canicola* infected animals, and the correlation between titres and ages. The bar chart in Fig. 2 illustrates graphically the distribution of infection in different age groups.

Sex Incidence. From Table II it will be seen that approximately 3 times as many males as females were infected with *L. canicola*. Of 12 animals infected with *L. icterohaemorrhagiae*, 6 were males and 6 were females.

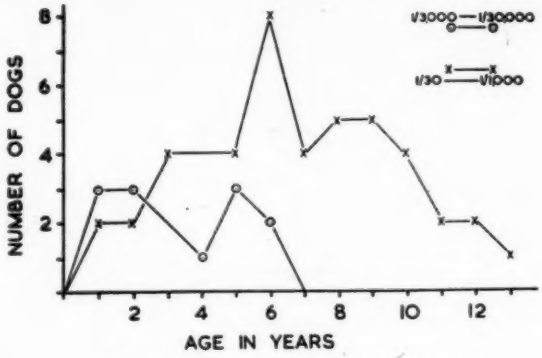

FIG. 1.—Correlation between titres and age, for both sexes.

TABLE II

AGE INCIDENCE OF LEPTOSPIRAL INFECTION FOR MALES AND FEMALES

Age	M.	+ve L.C.	+ve L.I.	Same titre	Lepto. +ve total	%	F.	+ve L.C.	+ve L.I.	Lepto. +ve total	%	M. & F.	+ve L.C.	%	+ve L.I.	%	Total lepto. +ve	%
0–6 m.	30	0	0	0	0	0	17	0	0	0	0	47	0	0	0	0	0	0
6–12 m.	32	5	2	0	7	21·9	15	0	0	0	0	47	5	10·6	2	4·3	7	14·9
1–2 y.	16	3	2	0	5	31·25	7	2	2	4	57·2	23	5	21·7	4	17·4	9	39·3
2–3 y.	6	4	1	0	5	83·3	3	0	0	0	0	9	4	44·4	1	11·1	5	55·5
3–4 y.	6	3	0	1	4	66·6	2	0	1	1	50·0	8	3	37·5	1	12·5	5	62·5
4–5 y.	8	6	0	0	6	75·0	3	1	1	2	66·6	11	7	63·5	1	9·1	8	72·6
5–6 y.	8	7	0	0	7	87·5	6	3	0	3	50·0	14	10	71·4	0	0	10	71·4
6–7 y.	3	2	0	1	3	100·0	3	2	0	2	66·6	6	4	66·6	0	0	5	83·3
7–8 y.	3	2	0	1	3	100·0	4	3	0	3	75·0	7	5	71·4	0	0	6	86·3
8–9 y.	4	4	0	0	4	100·0	2	1	1	2	100·0	6	5	83·3	1	16·6	6	100·0
9–10 y.	3	2	1	0	3	100·0	5	2	1	3	60·0	8	4	50·0	2	25·0	6	75·0
10–11 y.	4	2	0	0	2	50·0	0	0	0	0	0	4	2	50·0	0	0	2	50·0
11–14 y.	4	3	0	1	4	100·0	3	0	0	0	0	7	3	43·0	0	0	4	59·0
Totals	127	43	6	4	53	41·7	70	14	6	20	28·6	197	57	28·9	12	6·1	73	37·0

M. = Male. +ve L.C. = A positive titre of 1 : 30 or over to *L. canicola*.
F. = Female. +ve L.I. = A positive titre of 1 : 30 or over to *L. icterohaemorrhagiae*.
Same titre = Animals having the same titre to *L. canicola* and *L. icterohaemorrhagiae*, 1 : 30 or over.

TABLE III

BREED INCIDENCE

Breed	Pure	+ Lepto.	Mongrel	+ Lepto.	Total	+ Lepto.	%
Fox Terrier	20	8	50	18	70	26	37·0
Collie	23	9	19	5	42	14	33·3
Alsatian	19	6	4	2	23	8	35·0
Labrador	3	1	18	6	21	7	33·3
Spaniel	9	7	6	4	15	11 (10 over 5 years)	73·3
Cairn	4	1	1	0	5	1	20·0
Scottie	2	0	3	0	5	0	0
Bull Terrier	4	0	0	0	4	0	0
Dalmatian	1	1	1	1	2	2	100·0
Boxer	2	1	0	0	2	1	50·0
West Highland Terrier ...	2	1	0	0	2	1	50·0
Schipperke	1	0	0	0	1	0	0
Corgi	0	0	1	1	1	1	100·0
Whippet	1	0	0	0	1	0	0
Airedale	0	0	1	0	1	0	0
Poodle	1	0	0	0	1	0	0
Setter	0	0	1	0	1	1	100·0
Totals	92	35	105	38	197	73	37·0

+ Lepto. = A titre of 1 : 30 or over to *L. canicola* or *L. icterohaemorrhagiae*.

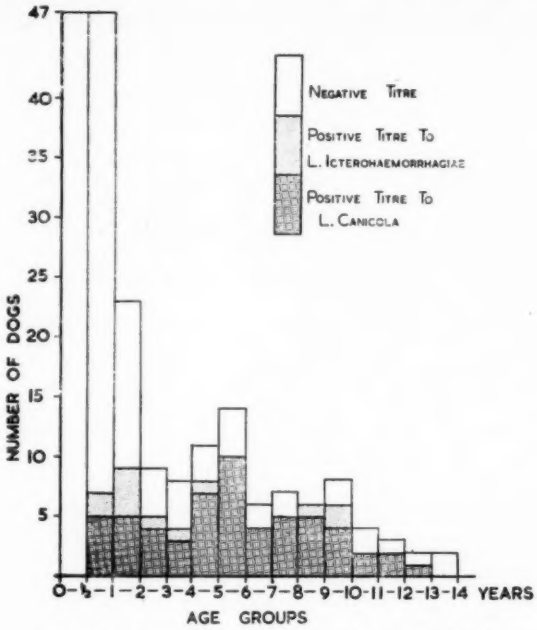

FIG. 2.—Distribution of infection shown graphically.

Breed incidence. Table III shows breed incidence of *L. canicola* and *L. icterohaemorrhagiae* positive serums and includes 4 dogs having the same titres to both. Mongrels were allocated to the breed which they most resembled.

Urine analysis. Urine from 98 animals was examined. The results are shown in Table IV. No leptospirae were found in these urine samples. Approximately one-third of the animals with negative titres had obvious distemper.

TABLE IV
URINE ANALYSIS

Totals	Protein + casts	%	Protein only	%	Both —ve	%
42 +ve *L. canicola*	26	61·9	12	28·6	4	9·5
56 —ve "	36	64·3	15	26·8	5	8·9

+ve = A titre of 1 : 30 or over.

Blood urea estimations. Table V shows the mean blood urea levels of the dogs with leptospiral titres and of those without.

TABLE V
BLOOD UREA ESTIMATIONS

	Number examined	Mean (mg. per 100 ml.)	Standard deviation
+ve titre to *L. canicola*	54	37·6	±12
—ve " "	129	30·0	±8·7

+ve titre = 1 : 30 or over.

Discussion

The only previous survey of the incidence of canine leptospiral infection in Glasgow was carried out by Stuart (1946). He found that of 100 animals tested 40 showed positive titres to *L. canicola* and 4 showed positive titres to *L. icterohaemorrhagiae*.

In the present series the incidence of *L. canicola* infection is rather lower and the incidence of *L. icterohaemorrhagiae* infection is slightly higher than in the 1946 survey. In the earlier survey, however, mostly old dogs were used and when this fact is taken into account it is possible that there has been little change in the incidence of leptospirosis during the last 10 years.

It is interesting to note that the results of previous surveys carried out in England are very similar to the results obtained from the present investigation. Broom and MacIntyre's (1948) results showed a lower incidence but mainly young dogs were sampled. Mills (1948) showed a higher incidence but there were only 11 animals in the series. Joshua and Broom (1949) obtained almost identical results to the present series using a large number of unselected animals from an urban population. Attention must be drawn however to the figures published by Davies (1955) showing only a 2.8 per cent. incidence of *L. canicola* infection. This publication does not state clearly the source from which these dogs were taken and it may be that fewer lived in large cities. It would certainly appear that in urban areas such as Glasgow the incidence of infection has changed relatively little during the last 10 years despite the widespread use of penicillin, although penicillin has probably reduced the mortality from the disease and may have limited the number of severe cases of acute nephritis.

The present survey shows a definite sex incidence. Of 127 males examined 43 (33.9 per cent.) had titres against *L. canicola* whereas of 70 females examined 14 (20 per cent.) had titres against *L. canicola*. It is difficult to be sure whether or not this difference in incidence represents the results of the different degrees of promiscuity of the male and the female. It is true that male dogs tend to lick urine more frequently than do females and this may be a contributory factor, but nonetheless incidence in the female is still strikingly high.

There are several interesting features regarding age incidence. No animal under 6 months of age showed a positive titre. Once this age is passed there is a steadily rising incidence of serological evidence of infection up to 9 years of age. In still older dogs there is a lowered incidence which may be explained by the small numbers in the group but also by the fact that many infected dogs will have died of renal failure before reaching this age. Animals showing a high titre, *i.e.*, 1 : 3,000 and over, are more likely to occur in the lower age groups than in the higher. These animals are examples of primary infection and they will enter the low titre groups if they survive. It is also probable that many dogs having low titres have made the transition from the non-infected to the infected state without exhibiting either clinical signs or higher titres.

From this present survey there is no evidence of a breed incidence as has been suggested by Joshua (1949). It will be noticed that in 4 of the groups

with reasonable numbers of cases the incidence of infection approximates the general incidence of 37 per cent., *i.e.*, Fox Terriers, Collies, Alsatians and Labradors show incidences of 37, 33·3, 35 and 33·3 per cent. respectively.

Of the Spaniel group which contains only 15 dogs, 10 are over 5 years of age and this would appear to be an adequate explanation for the unusually high incidence of 73·3 per cent. in this group.

It is interesting to note from the examinations of 98 urines that proteinuria and tubular casts are as common in dogs which have no titre against *L. canicola* as in those which have a titre. This is explained by the fact that there are many conditions leading to proteinuria and tubular casts other than infection with *L. canicola* and, as stated above, distemper is an important cause. It was also found that there is a significant elevation of the blood urea levels in the dogs which have *L. canicola* titres over those which have none.

In conclusion it may be stated that the continuing high incidence of leptospiral infection in the Glasgow area acts as a potential source of infection for man and that *L. canicola* is still a common cause of chronic renal disease in the dog.

Summary

1. Of 197 dogs examined 57 (28.9 per cent.) had positive titres to *L. canicola* and 12 (6.1 per cent.) to *L. icterohaemorrhagiae*. Four dogs showed the same titre to both.

2. *L. canicola* infection has a high incidence in males.

3. No animals under 6 months of age had a positive titre.

4. The incidence of *L. canicola* infection increases with age to a maximum at 9 years; the highest number of positive sera in an individual age group was in the 5- to 6-year-old group.

5. High titres occur usually in lower age groups.

6. There is no breed incidence.

References

ALICATA, J. E., & BREAKS, V. (1943). *Hawaii med. J.* **2.** 137.
DE AZEVEDO, J. F. (1943). *Ann. Inst. Med. trop.* (Lisbon). **1.** 13.
BABUDIERI, B., & CASTAGNOLI, B. (1940). *Ann. Igiene (sper.)* **50.** 145.
BESSEMANS, A., WIRRIEBOLLE, P., & DE BORCHGRAVE, O. (1938). *C.R. Soc. Biol.* 129, 906.
BROOM, J. C., & MACINTYRE, A. B. (1948). *Vet. Rec.* **60.** 487.
DAVIES, M. E. (1955). *Vet. Rec.* **67** 35.
GREENE, M. R. (1941). *Amer. J. Hyg.* **34.** 87.
JOSHUA, J. O., & BROOM, J. C. (1949). *Vet. Rec.* **61.** 711.
KING, E. J. (1947). "Microanalysis in Medical Biochemistry." J. & A. Churchill, Ltd., London.
KLARENBEEK, A., & SCHUFFNER, W. A. P. (1933). *Nederl. Tijdschr. Geneesk.* **77.** 4,271.
MCINTYRE, W. I. M., & STUART, R. D. (1949). *Vet. Rec.* **61.** 411.
MILLS, S. (1948). *Ibid.* **60.** 267.
MEYER, K. F., STEWART-ANDERSON, B., & EDDIE, B. (1939). *Amer. J. publ. Hlth.* **29.** 347.
NEWMAN, J. P. (1947). *J. Bact.* **53.** 369.
PETERSON, C. B., & JACOBSEN, E. (1937). *C.R. Soc. Biol. Paris.* **126.** 799.
RAVEN, C., & BARNES, K. (1940). *J. Bact.* **40.** 329.

(Concluded at foot of adjoining column)

The Control of External Parasites *

BY

H. E. HARBOUR,

Cooper Technical Bureau, Berkhamsted

IT is very useful from time to time to stop and ask ourselves—where are we going? Are the methods we are using the right ones? That is just what a conference of this kind should achieve. As opener to the discussion it is my job to review the whole field from my point of view and provide material for discussion so that we can all hear your views and your experiences.

I suppose the most important of the external parasites in the Caribbean area and in Central and South America is the cattle tick (*Boophilus annulatus* or *B. microplus*)—the most important because of the damage it causes, the diseases it carries, the costliness of control measures, and the fact that it is so widespread.

In some areas a parasite of no less importance is *Dermatobia hominis*, the "nuche," "torcel" or "berne," and a third which causes enormous damage is the screw-worm, *Cochliomyia hominivorax*. These are the really important parasites and I want to devote most of my time to the particular problems concerning their control. First, however, I must make a few remarks on general control measures to be adopted against the wide range of other external parasites, lice, sheep keds, sheep scab and the various types of mange of the domestic animals, biting flies, mites affecting poultry, fleas and so on.

Chemical control

In all these cases the present-day control measures involve the application of chemical substances to the animal or to the houses in which they live.

Before the last war the principal chemicals used were arsenic, sulphur, phenols, derris, lime-sulphur, pyrethrins and nicotine, and some of these are still in use for certain purposes. For instance, despite the synthesis of large numbers of powerful organic insecticides nothing has been found to improve on the results obtained with rotenone preparations (based principally on derris) for the control of the ox warble fly or cattle grub (*Hypoderma* spp.). Arsenic is still used too for the control of cattle tick, and sulphur in various dressings for treatment of mange, while lime-sulphur or arsenic-sulphur combinations are the best materials for the control of the itch-mite, *Psorergates ovis*.

* Paper presented to the Second British Caribbean Veterinary Congress, Kingston, Jamaica, July, 1956.

SAVINO, E., & RENNELLA, E. (1944). *Riv. Inst. Bact.* "Dr. Charlos G. Malbran." **12.** 215.
STUART, R. D. (1946). *Vet. Rec.* **58.** 131.
———. (1946). *J. Path. & Bact.* **58.** 343.
UHLENHUTH, P., & ZIMMERMANN, E. (1936). *Dtsch. med. Wschr.* **62.** 891.
VAN DER WALLE, N. (1939). *Ned. Tijdschr. Geneesk.* **83.** 740.
WOLFF, J. W. "The Laboratory Diagnosis of Leptospirosis." American Lecture Series No. 183. Blackwood, Oxford, 1954.

Derris, too, is still one of the best general insecticides for control of lice and fleas on dogs. Pyrethrins find their principal uses in domestic fly sprays and insect powders but a comparatively modern development is their use in various combinations as fly repellents for cattle.

With the war came the development of the powerful insecticides that we know to-day—first DDT and benzene hexachloride, then toxaphene, chlordane, dieldrin and aldrin and the group of organophosphorus insecticides which is still rapidly growing. There is, indeed, a bewildering assortment of insecticides from which to choose and their various properties are being intensively studied all over the world.

It is now very easy to eradicate lice from any animals and keds from sheep, although sucking lice are more difficult to kill than biting lice. These parasites can be eradicated with almost any of the modern insecticides, but probably gamma-BHC is the most commonly used. It will eradicate infestations of lice and keds on sheep if applied in a single dipping at a concentration of 0.004 per cent.

Dieldrin, too, is very efficient in controlling lice and in addition is quite remarkably persistent in sheep fleece. In Britain, and in Australia, New Zealand and S. Africa dieldrin is now commonly used for the control of sheep blowfly at concentrations varying from 0.025 per cent. to 0.25 per cent. (according to the method of application). These concentrations are far greater than those required for the eradication of lice and keds.

For the treatment of the various types of mange, toxaphene, chlordane and dieldrin can be used but gamma-BHC is certainly the most efficient. In Britain, the general introduction of BHC led quickly to a marked improvement in the control of sheep scab (*Psoroptes comm. ovis*) and this disease has now almost certainly been eliminated from England, Scotland and Wales. The same has happened in other parts of the world and nearly everywhere sheep scab has been brought to very low levels or been eliminated altogether.

For sarcoptic mange in cattle, pigs, dogs and other animals a concentration of 0.015 per cent. gamma-BHC repeated at a 10-day interval will achieve control but higher concentrations may be used with safety and may achieve eradication in a single application. With cattle and pigs, however, one can reckon on very little retention of insecticides in the coat, and a double treatment gives more certain results.

It must be admitted that the modern synthetic insecticides have not proved very effective in controlling biting flies though toxaphene and DDT have given excellent results against the hornfly. The most effective control of the biting flies has been given by application of pyrethrins in combination with a synergist such as piperonyl butoxide as these combinations give a marked repellency effect. However, effective residual protection against fly-worry needs the deposition of 20 mg. pyrethrins and 200 mg. piperonyl butoxide per square foot of hide. This can be achieved by applying appropriate pyrethrins/piperonyl butoxide mixtures as a fine spray, about 2 to 3 pints per animal. Animals so treated remain free from stable-fly and house-flies for 36 to 48 hours (Stones, 1956).

Granett and his co-workers (Granett, P., *et al.*, 1955) have reported effective repellency for 3 to 5 days with cyclethrin, a new synthetic pyrethrin type insecticide applied as a water based spray and remarked that part of the toxicant could be replaced with butoxy poly propylene glycol. The control of biting flies is an important problem in many parts of the world, but although pyrethrin combinations give effective repellency the persistence of the deposits is rather limited and the treatment is consequently somewhat expensive.

Pyrethrins/piperonyl butoxide combinations have also been found convenient and effective in the control of lice and red mite infestations in poultry—especially when applied from a pressure packed dispenser to birds confined in batteries. Details of these treatments and of the application of gamma-BHC for control of external parasites of poultry will be found in a paper by Brander (1954).

Methods of Application

Dipping

Before turning to a discussion of the most important parasites of this area I should like to say a little about methods of application. First of all—dipping. The dipping bath is the simplest method of application of an insecticide to the animal's body. What could be simpler than a hole in the ground? There is, however, a good deal to know about the planning and installation of a dipping bath and of its proper maintenance.

When a farmer gets indifferent control of the cattle tick he is very apt to jump to the conclusion that the tick has become resistant to insecticides. This may not be the case and the elimination of faults in the dipping bath and of the general management of the dippings will often give vastly improved results.

Spraying

There is no doubt that simple immersion or dipping is the most effective way of ensuring the penetration of the insecticide right down to the skin and it is the method of choice for the eradication of sheep scab or the treatment of sarcoptic mange in the dog. It is also the most certain method for control of various sheep parasites, but with improvement in modern insecticides and wetting agents various systems of spraying have become more practicable, and they are often more convenient. In this connexion I should mention dieldrin, for it has been found that this insecticide can be applied as a comparatively light spray to the outside of the sheep's fleece, but will be found eventually on the wool fibres at the skin surface. It will then kill larvae of the sheep blowfly and other parasites deep in the fleece. This insecticide is also remarkably persistent in sheep's fleece. Its development has materially improved the degree of control achieved against the various sheep blowflies, and has made possible the development of run-through spray races for the convenient and easy treatment of sheep.

For the control of cattle tick and other external parasites of cattle, dipping is still the most widely

used method, and is perfectly efficient if well managed, but application by spraying, in properly designed spray races, is beginning to prove very popular in many countries. It is a development which has been, to some extent, hastened by the use of modern synthetic insecticides, and if resistance problems increase very much the tendency to change to spraying methods will be all the greater.

In small herds and in dairies almost any simple type of spraying apparatus can be used, and the efficiency of the method depends upon the diligence with which the insecticide is applied. In Uganda the method of hand-spraying is widely practised and special crushes are constructed to hold the animals during the spraying operation, which is carried out by two operators working on each side of the line of animals. Another method of hand spraying is by using a high pressure spray and directing the jet on the animals *en masse* in the corral. This is easy and convenient but rather wasteful of material, and where complete coverage of the animal is required it is not a very efficient method. Where it is only necessary to spray generally over the backs (as for hornfly control) it is quite a convenient method.

When cattle have to be treated at regular short intervals and given a very thorough coverage of insecticide then a properly-designed spray race should be used. There are various types of these, but generally they comprise a pump which delivers insecticidal wash from a sump, through a system of piping fitted with nozzles directed so as to give a dense wall of spray through which the animal must pass. The spray dripping from the animals returns to the sump through filters and is used again.

These spray races are efficient and convenient and in the best types it is possible to handle over 600 head of cattle every hour, without undue haste. Spraying is, on the whole, kinder to cattle than dipping, and dairy cattle passed through a spray race will suffer no "dipping-day loss" of milk yield. Then, too, there is greater economy of dipping fluid and a smaller capital cost of filling the spray-sump. This has the advantage, too, that it is possible to use fresh, clean wash at every spraying operation and this avoids any chance of degradation of the insecticide. Moreover, it is possible to change over from one insecticide to another and this may make it possible at least to delay the development of resistant strains.

Before leaving the subject of spraying I should mention the development of treadle-sprayers operated by the animal (Bruce & Decker, 1951). These are designed to apply a small quantity of highly concentrated repellent (usually a pyrethrins/synergist mixture) on the backs of cattle and they are placed so that cattle must pass through them at frequent intervals, *e.g.*, when they come in for milking. The method is attractive but it is doubtful if the ideal combination of spray outfit and repellent has yet been evolved.

Dusts

Control of such parasites as cattle lice by the application of insecticidal dusts is fairly common practice and the method of dusting has its advocates for control of other parasites too. For instance, Pfadt and Ryff (1955) describe the use of a power duster for the application of dieldrin powder for the control of the sheep ked *Melophagus ovinus*. Dusting powders are also commonly used for hand application on small-animals and poultry.

Perch-Paints

For the control of poultry lice we make use of insecticides with fumigant properties and perch-paints containing gamma-BHC are very effective.

Rubbers

A convenient way of applying insecticides for the control of hornfly is by the provision of back rubbers which the cattle use themselves These are simple devices located in areas where cattle have ready access to them and they are claimed to give good control of hornfly. They are certainly convenient, labour saving and economical for application with range cattle (Rogoff & Moxon, 1952).

Pressure-pack Sprays

I have already mentioned the use of pressure-pack sprays for the control of red mite and lice of poultry. Another usage for these is in the treatment of cattle wounds infested with screw-worm. The pressure-pack is quite a handy means of applying a dressing to a wound and this type of remedy has become popular in the U.S.A.

So much for methods of application. I should like now to discuss the control of the 3 more important parasites to which I drew attention earlier in the talk.

Cattle Tick Control

The cattle tick *Boophilus microplus*, or *Boophilus annulatus*, is one of our most important parasites in this area, not only because of its ability to transmit piroplasmosis and anaplasmosis, but also because of the direct effect of heavy infestations.

It has been virtually eliminated from the United States and there is little doubt that it could be eliminated altogether from many of the islands in the Caribbean area if funds were available and suitable plans were put into operation.

When eradication is not sought then the farmers' aim must be to keep the tick down to small numbers, retaining a low-grade infestation which is sufficient for premunisation against piroplasmosis. Boophilus spp. however, present a problem because of the ease with which they appear to develop insecticide-resistant strains. I know of no other genus of tick which has presented this problem but Boophilus is a one-host tick limited to relatively few hosts and it has certainly learned how to protect itself by the development of resistant strains.

It was in 1938 that arsenic resistance in the blue tick *Boophilus decoloratus* first began to be recognised in South Africa, and it has since been suspected and sometimes confirmed, in many other countries. BHC was introduced in South Africa in 1946 primarily to control the arsenic-resistant tick

but Boophilus did not take very long to learn the trick of it and Whitnall and fellow workers (1952) recorded the appearance in South Africa in 1948 of the BHC-resistant strains. Since then we know of the development of BHC- and toxaphene-resistance in some strains in South America, while DDT-resistance has now been recorded in Australia (Legg *et al.*, 1955).

What can we do to control the resistant strains? In the field the first answer is to use higher concentrations or shorter intervals or to use other insecticides.

Hitchcock (1953), in recording the appearance of a BHC-resistant strain of *Boophilus microplus* in Queensland, pointed out that while a concentration of 500 p.p.m. of gamma-BHC had little effect on engorged females it caused 100 per cent. mortality of unattached larvae. He drew attention to the fact that control at this concentration would still be possible provided that the intervals between treatments were not long enough to permit parasitic stages to progress beyond that of the newly moulted adult. We can see an illustration of this in South Africa. In some areas the blue tick is solidly resistant to both BHC and arsenic, and if we do *in vitro* tests we find that the engorged females are also highly resistant to toxaphene. Nevertheless we find toxaphene still highly effective in controlling blue tick because it gives complete control of the young stages. In that area it is necessary to dip at weekly intervals in order to control the heavy infestations of 2- and 3-host ticks. Dipping at 7-day intervals with a toxaphene concentration of 0.25 per cent. proves effective against Boophilus because the insecticide is still active against the larval stages.

Naturally with the development of resistance to the chlorinated insecticides our thoughts are turning to other types and much experimental work is going on with various organo-phosphorus insecticides like malathion and diazinon. It is too early yet to say what place these organo-phosphorus insecticides will find in tick control but many of the preliminary results are quite promising.

It is unfortunate that we know virtually nothing of the mechanism of resistance in ticks—the chemical reactions which enable the tick to avoid the consequences of absorbing insecticide. Some work is going on in different parts of the world but it is a difficult problem. A proper understanding of the process might lead us to effective control measures but at the moment our chief answer is to switch the insecticide.

Alternation of insecticides is an obvious possibility though we have no real evidence as to how effective this may be. Once we have enough chemically-distinct and unrelated insecticides we may be able to switch them around from time to time to fool the tick, but although no very firm recommendation to alternate insecticides can be given at the moment, it is obviously a method worth trying.

However, it is as well not to get this picture of resistance out of perspective. Many farmers all over the world are getting satisfactory results with the existing insecticides—indeed, very large numbers still find arsenic quite effective. Loss of control of the cattle tick on a farm can often arise through an imperfect understanding of the parasite and through the development of slack dipping practices. Then, in a favourable season, the cattle tick builds up in huge numbers on pastures and infestations on cattle become correspondingly heavy.

Such very heavy infestations are very damaging to the cattle and very troublesome to control and the only remedy is to introduce at once a rigorous system of short interval treatment (preferably 7-day dippings) until control has been established. This is not a popular move with the farmer who likes to dip rather casually, once a month, but it is essential to get results. The aim should be to kill every larva which attaches and cut the life cycle to the extent that the pasture infestation drops to low levels. The farmer can then revert to longer intervals of a fortnight or more, but he should always be ready on sign of any loss of control to institute a temporary series of short interval dippings to re-establish control.

Investigation of complaints

When a veterinarian is called upon to investigate a complaint of ineffective cattle tick control he should not necessarily assume the presence of a resistant tick. It is wise first to check up on the dipping bath and its management, inspect the dipping records, sample the dipping wash for analysis and, if necessary, have the bath cleaned out and recharged with fresh insecticide. A check on the calibration of the bath is often worth while. Then he should consider the normal pasture management of the farmer and try to form some idea whether heavy tick infestations are likely to be present only on certain pastures. Institution of short interval dipping with a fresh wash together with change of pasture, if possible, may quickly effect control.

If resistance is suspected, engorged female ticks should be collected for an *in vitro* test to be carried out in comparison with known susceptible ticks in the laboratory. Spraying trials with fresh insecticide on small groups of animals can also give a good deal of information.

"Strategic" Dipping

In Australia much interest is being taken at the present time in the concept of "strategic dipping." Observations in Queensland have shown that populations of tick larvae in pastures are greatly reduced in numbers in winter and early spring. Moreover, the progeny of ticks engorging from late July to early September tend to hatch more or less simultaneously some time in September or October so that there is a marked "spring-rise." The theory of "strategic" dipping is based on the idea of detecting the "spring-rise" and of knocking it out by a schedule of short interval dippings. By doing this it is claimed that there is a high degree of pasture disinfestation so that dippings from January to April can be spaced at intervals of 7 to 10 weeks (C.S.I.R.O. 1954).

This is an attractive method but depends for its complete success on the detection of the "spring-rise." This is sometimes difficult. However, the idea is basically sound and might repay some study in the Caribbean area. If the farmer can be taught to

consider the tick problem in terms of pasture infestation and to use some of his cattle as "tick-traps" he can effect control all the year round and with proper observation on his part will really be effecting his own form of "strategic" dipping.

Temporary destocking of pasture

Another method of tick control which has some possibilities is that described by Wilkinson (1955). The method makes use of the fact that larval populations tend to die out on pastures and show a marked reduction in numbers after several months. In his experiments Wilkinson used paddocks of 75 acres and by destocking one paddock for a period of 3 to 4 months was able to reduce the population of ticks in the pasture very substantially. The result of alternation and destocking of pastures was to enable control of the tick to be established with a smaller number of dippings.

This method may be useful where adequate fencing is available and sufficient grazing exists for the farmer to leave large paddocks untenanted for some months at a time, but these conditions are not often realisable.

Control of Dermatobia

Dermatobia hominis, the "berne," "nuche" or "torcel," is a troublesome parasite in parts of Central and South America and I hope that some of the delegates attending this conference have had experience of it and can give us the benefit of their views on its control. In some areas it is even more important than the cattle tick and causes enormous damage.

Reasonable control of Dermatobia can be effected by regular dippings with BHC (0.03 per cent. gamma-BHC) at intervals of 7 to 14 days but toxaphene has proved more effective and is now widely used for this purpose at concentrations ranging from 0.28 per cent. to 0.55 per cent. There is need for more research on the nuche problem, but Toledo and his co-workers have made some notable contributions. Toledo and Sauer (1950) described experiments with guinea-pigs and cattle artificially infested with Dermatobia larvae. Of particular interest were their observations on the application of gamma-BHC orally or subcutaneously, and a high degree of control was achieved when this insecticide was applied at a dosage rate (either route) of 10 mg. per kilo bodyweight.

Control of Screw-worm

The screw-worm infestation of wounds is a problem of great importance for the Caribbean area. Most of the research on this problem has been done by United States workers. Eddy (1951) demonstrated the toxicity of various insecticides for larvae of *Callitroga americana* and it was this worker and his colleagues who developed the well-known screw-worm remedy EQ 335, which has gamma-BHC as its chief active ingredient. Other combinations of gamma-BHC have been used and dieldrin is also highly successful.

The development of pressure-packed lindane products for convenient first-aid application to wounds has already been mentioned. However, the outstanding achievement in this field has been the successful eradication of the screw-worm fly from the island of Curacao by the release there of male screw-worm flies reared artificially which had been rendered sexually sterile by irradiation. The planning of this exciting experiment followed a good deal of patient preliminary investigation which showed that the male fly could be sterilised without seriously affecting its mating behaviour, and that the female fly mates only once during its lifetime (Knipling, 1955, Baumhover *et. al.*, 1955). Following the successful campaign in Curacao, Lindquist (1955) describes the prospects of eradication from Florida as "promising" and this new method must be of particular interest to many of those attending this conference to-day.

Systemic Application of Insecticides

I should like to conclude with a brief reference to the prospects of the systemic application of insecticides. The idea of giving the insecticides in feed or in an injection is a very attractive one and many workers all over the world are paying attention to the possibilities of this method. McGregor and Bushland (1956) have recently reviewed the work which is going on in the United States, in the search for insecticides suitable for systemic use. In that country the chief emphasis in this work has been on the warble-fly because it is a very damaging parasite which lives for a good deal of its life inside the animal's body so that it might be particularly susceptible to a systemic insecticide if the right one can be found. A good systemic insecticide might also be attractive for the control of Dermatobia, screw-worm, cattle tick and the various types of mange, but the ideal substance has yet to be discovered. Gamma-BHC and dieldrin have both given quite promising results but the margin of safety is not great enough to warrant general usage, while the danger of laying down harmful deposits in the body fat is very real in the case of dieldrin. The Kerrville workers have tested large numbers of phosphorus insecticides, some of which have been found effective against various parasites; but much more work needs to be done before definite general recommendations can be made.

The "ideal" insecticide for systemic use will be difficult to find because it will not only have to be highly effective, toxic to parasites and selective in its action, but also it should be capable of persisting in the body fluids for at least a reasonable time. On the other hand, it should not persist for so long in body fat deposits as to constitute a health hazard to the consumer of the meat. The problems are difficult but they should not be insuperable, and it is to be hoped that the effort being put forward in this field will one day be rewarded.

In opening this discussion I have reviewed briefly the methods at present in use for the control of external parasites and touched on one or two interesting possible future developments. It has been impossible to deal in great detail with the many problems arising, but I hope I have said enough to stimulate all of you to recount his own personal experience. I hope we shall hear from all of you of the problems which are arising in the field and of the ways in which they are being tackled.

(*Concluded at foot of col.* 1, *page* 911)

The Victoria Veterinary Benevolent Fund

A meeting of the Council of the Victoria Veterinary Benevolent Fund was held at 10, Red Lion Square, London, W.C.1, on Tuesday, June 25th, 1957, when the following members were present:—

Mr. H. W. Dawes (President) in the Chair, Mr. E. Clark, Major J. J. Dunlop, Mr. R. C. U. Fisher, Mrs. D. I. Glover, Mrs. Betty Pugh, Professor L. P. Pugh, Miss V. Tillemont-Thomason, Captain Wm. Watt, and Major W. H. Wortley.

Mr. C. W. Francis, Secretary, was in attendance.

Welcome to New Member

Before proceeding with the business on the agenda, the President welcomed Mr. R. C. U. Fisher, M.R.C.V.S., newly elected representative of the South Eastern Veterinary Association, to the meeting.

Minutes

The Minutes of the previous meeting, held on April 26th, 1957, having been published in THE VETERINARY RECORD, were taken as read and signed as correct.

Apologies for Absence

The Secretary reported the receipt of apologies for absence from Messrs. G. Atkinson, E. A. Barrett, J. A. Flynn, G. N. Gould, Dr. R. E. Glover, Mr. A. A. Lamont, Professors R. Lovell, J. McCunn, A. Messervy, W. M. Mitchell, Messrs. G. M. G. Oliver, Arnold Spicer, J. F. D. Tutt, Miss O. Uvarov, Professor W. L. Weipers, and Captain A. Whicher.

Correspondence

A letter was read from Barclays Bank Ltd., Cardiff, of June 3rd, referring to previous correspondence and enclosing cheque for £100 bequeathed to the Fund by the late Mr. Reginald William Hall.

Investments

In the absence of the Treasurer, the Secretary reported:—

(a) That the £1,000 left to the Fund by the late Mr. Geo. P. Male had been invested by the Executive Committee in the purchase of £1,171 1s. 5d. York Corporation 4 per cent. Red. Stock, 1952/72.

(b) That the Committee had caused the balance of £370 standing in the Donations Account to be invested in the purchase of £419 15s. 1d. British Electricity 4½ per cent. Guar. Stock, 1974/79.

It was resolved that the action of the Executive Committee be approved.

Accountant's Report

The Secretary submitted the following report which was approved, a vote of thanks being accorded to the respective donors:—

Since the previous meeting of Council, the following legacies, donations, and special subscriptions have been received:—

	£ s. d.	£ s. d.
Legacies		
R. W. Hall of Barry		100 0 0
G. P. Male of Reading		1,000 0 0
Donations		
Life Membership		
R. E. Glover	10 10 0	
G. C. Knight	10 10 0	
W. H. Wortley	10 10 0	
Cruft's Dog Show	13 2 6	
R. H. Owen	4 0 0	
Royal (Dick) School of Veterinary Studies Students' Committee ...	5 0 0	
Royal Veterinary College Revue Committee	20 0 0	
Society of Women Veterinary Surgeons	3 3 0	
Southern Counties Veterinary Society	10 10 0	
Surrey Federation of Young Farmers Clubs (per Mr. E. P. Barrett)	2 2 0	
A. H. Tench	13 6	
A. Whicher	10 6	
		90 11 6
Collecting Boxes		
Association of State Veterinary Officers	8 10 0	
Ayrshire Veterinary Association ...	1 0 0	
Beds and Herts Division	5 10 0	
Central Veterinary Society ...	10 15 7	
Dumfries and Galloway Division	4 13 8	
Scottish Branch, B.V.A.	2 4 5	
Scottish Metropolitan Division ...	1 16 7	
Scottish Regional Group—Association of Veterinary Teachers and Research Workers	1 6 0	
Southern Counties Veterinary Society	5 10 0	
Western Counties Veterinary Association	5 4 0	
		46 10 3
		£1,237 1 9

The Control of External Parasites.—*Concluded.*

References

BAUMHOVER, A. H., GRAHAM, A. J., BITTER, B. A., HOPKINS, D. E., NEW, W. D., DUDLEY, F. H., & BUSHLAND, R. C (1955). *J. Econ. Ent.* **48.** 462–6.

BRANDER, G. C. (1954). "The Control of External Parasites on Poultry." Section Papers of the 10th World Poultry Congress.

BRUCE, W. N., & DECKER, G. C. (1951). *J. Econ. Ent.* **44.** 154–9.

EDDY, G. W. (1951). *Ibid.* **44.** 254.

GRANETT, P., & HAYNES, H. L. (1955). *Ibid.* **48.** 409–12.

HITCHCOCK, L. F. (1953). *Austr. J. of Agric. Res.* **4.** 360–3.

KNIPLING, E. F. (1955). *J. Econ. Ent.* **48.** 459–62.

LEGG, J., BROOKS, O. H., & JOYNER, C. (1955). *Austr. Vet. J.* **31.** 148.

LINDQUIST, A. W. (1955). *J. Econ. Ent.* **48.** 467–9.

MCGREGOR, W. S., & BUSHLAND, R. C. (1956). *Ibid.* **49.** 86–8.

PFADT, R. E., & RYFF, J. F. (1955). *Ibid.* **48.** 195–7.

ROGOFF, W. M., & MOXON, A. I. (1952). *Ibid.* **45.** 329–34.

Sixth Ann. Report of the C.S.I.R.O. Australia (1954). 62.

STONES, L. C. (1956). Private communication.

TOLEDO, A. A., & SAUER, H. F. G. (1950). *Biologico.* **16** 25–34.

WHITNALL, A. B. M., THORBURN, J. A., MCHARDY, W. M., WHITEHEAD, G. B. & MEERHOLZ, F. (1952). *Bull. Ent. Res.* **43.** 51–65.

WILKINSON, P. R. (1955). *Nature.* **176.** No. 4,480.

Special Subscription

W. A. S. Stevens (Covenant for annual subscription of £7 10s. 0d. which, at the present standard rate, will produce approximately £13 per annum for the Fund).

Life Membership

The following were unanimously elected Life Members of the Fund:—

Dr. R. E. Glover, Mr. G. C. Knight, Mr. W. A. S. Stevens, and Major W. H. Wortley.

Garnett Annuity

The Secretary reported the receipt of a letter dated June 13th, 1957, from the Registrar, Royal College of Veterinary Surgeons, stating that his Council at its recent meeting had nominated Mr. R. M. Campbell, M.R.C.V.S., Dungiven, N.I., to be the Garnett Annuitant in the place of the late Mr. E. G. Robertson, M.R.C.V.S.

It was resolved that the recommendation of the Council of the Royal College of Veterinary Surgeons be given effect to, and that Mr. Campbell be also given the sum of £10 out of the Special Gift Account.

The Secretary was instructed to report to the next meeting the arrangements which had been made regarding the payment of the annuity, etc.

Cases

The Secretary having submitted reports from local members of the profession on the following 6 cases, which they had visited at the request of the Council, *it was resolved*:—

No. 105. Widow, aged 70. That the grant be increased by 5s. per week.

No. 205. Daughter of late member. Aged 61. That for the time being, no change be made in the present grant.

No. 265. Widow, aged 65. That the Secretary be requested to ascertain whether this recipient was eligible for a non-contributory pension, and that meantime, her present grant of £2 per week be continued.

No. 269. Daughter of late member. Aged 71. That no change be made in the present grant of £1 per week.

No. 305. Widow, aged 60. That the present grant of £2 per week be continued for a further 12 months.

No. 314. Widow, aged 72. Receiving help from the National Assistance Board. That a grant of 10s. per week be made in this case, and that the Secretary be asked to look into the question as to whether she is eligible for a pension in respect of her son who was an Observer in a plane which failed to return to base in June, 1940.

No. 273. Widow, aged 48. Correspondence having been submitted in this case to the effect that her application to the Department of Social Welfare, Dublin, for a Widow's non-contributory pension had been unsuccessful, the Secretary was instructed in regard to the action to be taken in this matter, and report to the next meeting.

No. 276. Widow, aged 72. Suffers with arthritis. The Secretary reported that, acting on the instructions at the last meeting he had obtained appropriate forms from the National Assistance Board on which this recipient should make application for a non-contributory pension, and that in May, the Board granted her a pension of 26s. per week. He also ascertained from the Board that provided the grant did not exceed 5s. 6d. per week, her pension would not be disturbed.

It was therefore resolved that the grant in this case be reduced to 5s. 6d. per week.

No. 290. Widow, aged 58. Partially blind. Son and daughter. Son a student.

A report of the Executive Committee on the action taken in this case having been read, *it was resolved* that the grant of £3 per week, to help towards the son's education, be continued until December 31st next; and that the grant be further reviewed at the January, 1958, meeting.

No. 320. M.R.C.V.S., aged 84. Invalid. Wife also in poor health. Small income.

It was resolved that a grant of £2 per week be made for the next 12 months, after which the allowance be reviewed.

No. 284. M.R.C.V.S., aged 75. An application having been received for help towards the purchase of clothing, etc., it was agreed that his request be acceded to and that a special grant of £25 be made in this case.

Date of Next Meeting

If was agreed that the date of the next Council Meeting be left in the hands of the Executive Committee.

Other Matters

(a) *Qualification of Life Member.* A proposal put forward by Mr. Arnold Spicer that steps should be taken to increase the Life Membership qualification to at least 30 guineas was debated at some length, but it was decided to take no action in the matter.

(b) *Diamond Jubilee.* The Victoria Veterinary Benevolent Fund having been founded in 1897 to commemorate the Diamond Jubilee of Her late Majesty Queen Victoria and this year being the Diamond Jubilee of the Fund, the Council felt it should take the opportunity afforded by such an occasion to make a special appeal to all members of the profession.

It was therefore unanimously resolved that the President be asked to prepare an appropriate appeal on behalf of the Council for insertion in THE VETERINARY RECORD.

DONATIONS IN MEMORY OF PROFESSOR G. H. WOOLDRIDGE

Relatives, members of the profession, and friends have contributed a total of £48 5s. 6d. (in lieu of flowers) to the Victoria Veterinary Benevolent Fund. The Fund gratefully acknowledges donations from the under-mentioned:—

Anderson, L. G.; Anderson, Wm.; Bell, H.; Bosworth, Professor T. J.; Buxton, Dr. J. C.; Clifford, Frank; Drysdale, J. M.; Freak, Miss M. J.; Fuerst, H. R.; Glover, Dr. R. E.; Hopson, C. G.; Joshua, Miss J. O.; Marshall, Miss J. Y.; Marston, Mr. and Mrs. T. W.; Murray, H. P.; Ottaway, Professor and Mrs. C. W.; Richardson, G. H.; Royal Jubilee Chapter No. 72 (Banstead); Royal Veterinary College; Scorgie, Professor N. J.; Scott, Captain F. C.; Steele, Mrs. P. N.; Ticehurst, R. E.; Trotman, Mrs. D.; Turner, May; White, J. B.; Wilson, H. McI.; Lothian, Miss Janie.

ANNUAL GENERAL MEETING OF THE LADIES' GUILD V.V.B.F.

The 26th Annual General Meeting of the Ladies' Guild was held in the School of Veterinary Medicine, Cambridge, on Tuesday, August 27th, 1957. A record number of 63 ladies attended.

The minutes of the 25th Annual General Meeting were approved and signed by Mrs. L. P. Pugh. Mrs. Hill-Owens, Hon. Secretary, gave a report for the year of the good work done by the ladies. Special thanks were made to the President, Mrs. L. Pugh, and Mrs. Field, Local Hon. Secretary, for their work for the Congress which was enjoyed by so many.

Mrs. Mitchell resigned as Local President of the Scottish Branch, and Mrs. A. Thompson was nominated as her successor. Mrs. Hill-Owens resigned as Hon. Secretary and was thanked most sincerely for her services.

Election of Officers for 1957-8

President, Mrs. K. G. R. Kelly; *Hon. Treasurer*, Mrs. D. I. Glover; *Hon. Auditor*, Professor Bell; *Hon. Secretary*, Mrs. E. McF. Jones.

Hon. Treasurer's Report

All the members who support the Ladies' Guild so loyally and generously will be very pleased to know that the sum of £1,117 has been raised this year. Three new Divisions have been formed and this will mean added interest in the areas concerned. A very generous sum was received from Scotland, and sincere thanks go to Mrs. Mitchell for all the work she has done for the Ladies' Guild for so long.

Details of Amounts Received

	£	s.	d.
1956			
Proceeds of Dance at Leamington £155 12 0			
Raffle £130 14 6	286	6	6
1957			
Central Division	27	13	6
E. Counties Division	16	17	6
Eire	88	4	4
N. Ireland	29	0	0
Lancs and Cheshire Division	19	10	0
Midlands Division	6	3	6
N. Wales Division	40	0	0
S. Wales Division	125	0	0
Treasurer's Subscriptions and Donations ...	43	1	0
Scottish Branch Subscriptions and Donations	71	6	6
Dance at Ayr, arranged by Mrs. Wilson ...	122	9	0
Dance at Dumfries, arranged by Mrs. Kennedy	59	10	0
Dance at Penrith, arranged by Mrs. Barr ...	72	10	0
Dance at Aberdeen, arranged by Mrs. Service ...	56	0	0
Dance at Edinburgh, arranged by Mrs. Spreull	50	17	8
	£1,117	9	6

NEW VECTOR FOR MYXOMATOSIS

Australian scientists are investigating the possibility of using the European rabbit flea as a vector for myxomatosis. The rabbit flea is at present unknown in Australia, and the mosquito, *Anopheles annulipes*, has acted as vector. If, however, the flea is found capable of surviving and spreading myxomatosis under Australian conditions without affecting other native fauna, it will be widely released in a renewed attack against rabbits.

Current Literature

ABSTRACTS

Relationship of Age to Susceptibility of Non-vaccinated Cattle to *Brucella abortus*. GOODE, E. R., MANTHEI, C. A., & AMERAULT, T. E. (1957). *Am. J. vet. Res.* **18.** 279-82.

The authors found that when non-vaccinated cattle were reared in a Brucella-free environment there was no significant difference in the susceptibility of cattle of different ages to experimental infection with *Br. abortus*.

***Salm. thompson* Gastro-enteritis. Report of Two Outbreaks.** WRIGHT, HELEN A., NORVAL, J., and ORR, A. (1957). *Brit. Med. J.* July 13th, 1957. 69-71.

The first outbreak occurred in May, 1956, and involved a limited number of patients widely distributed throughout the city. Suspicion was finally centred on a city bakery and restaurant. Careful investigation showed that the source of infection must have been Chinese egg albumen used in the bakery.

The second outbreak occurred in August, 1956. The local circumstances of this outbreak strongly suggested that the source was the supply of tuberculin-tested unpasteurised milk direct from the farm to households in the surrounding district. Veterinary inspection revealed a sick cow amongst the 24 in the herd. *Salm. thompson* was isolated from the faeces and milk of the sick cow on both August 16th and 21st, but no pathogenic organisms were located from the bulk milk on numerous occasions. *Salm. thompson* was recovered from the human cases.

The sick cow was removed from the herd and though at a later date specimens of faeces and milk were consistently negative she was not returned to the herd. There were no more human cases after her removal from the herd.

G. F. B.

The Growth of *Staph. aureus* in Milk with Special Reference to Food Poisoning. (1957). JONES, A. C., KING, G. J. G., FENNELL, H., and STONE, D. *Mon. Bull. Minist. Hlth Lab. Serv.* **16.** 109-22.

Although staphylococci are common in cows' milk, cases of staphylococcal food poisoning in man, associated with the drinking of raw milk, are comparatively rare. The authors investigated this point experimentally and concluded that food poisoning is unlikely to occur unless milk from an infected udder is withdrawn under good hygienic conditions kept at a fairly high temperature (*e.g.* 25° to 37° C.) for a sufficient length of time, is not mixed with the milk of other cows to a degree sufficient to dilute the staphylococcal toxin below the active level, and is drunk raw. Since a combination of these conditions seldom occurs in this country, staphylococcal food poisoning caused directly by milk is necessarily uncommon.

E. A. G.

News and Comment

HEREDITY AND ENVIRONMENT IN DETERMINING QUANTITATIVE CHARACTERS

A special university lecture in agriculture entitled "Interaction of Heredity and Environment in Determining Quantitative Characters," will be given by Dr. Artur Hansson, Director of The Animal Breeding Institute, Wiad, Sweden, at the University of London, Senate House (entrance from Malet Street or Russell Square, W.C.1), at 5.30 p.m. on Wednesday, October 23rd, 1957. The Chair will be taken by Professor William Holmes, Professor of Agriculture in the University of London, and admission will be free, without ticket.

BARKING DEER

Farmers harvesting corn this summer have been encountering a new form of vermin. This animal, which is too fast and too agile to be caught with dogs, is considered to be potentially as serious a menace to agriculture as the rabbit. It is the little barking deer, about the size of an Alsatian dog, which originally escaped from Woburn Park in Bedfordshire, but has now been reported as far afield as Hertfordshire.

It is feared that the deer may take the place of the rabbit as a farm pest, and its apparently rapid spread through the countryside is being compared to that of the grey squirrel, which escaped in the first place from the Zoo in Regent's Park. One farmer found seven of these deer in an 8-acre cornfield; they had trampled the corn flat in many places and had eaten and spoiled as much as 5 cwt. of corn per acre.

UNIVERSITY NEWS

Liverpool

Faculty of Veterinary Science Examination List for the Ordinary Degree of B.V.Sc., September, 1957: Ashcroft, R. A.; Crabb, P. J.; Dickinson, L. G.; O'Malley, Mary C. B.

PERSONAL

Births

GOURLEY.—On July 22nd, 1957, to Ruth, wife of Jim Gourley, B.SC., M.R.C.V.S., of 3, Poplar Grove, Ashton-under-Lyne, Lancs, a daughter, Heather—sister for Ian, Sheila, and Michael.

LEE.—On August 17th, 1957, to Joyce, wife of R. P. Lee, M.R.C.V.S., of Vom, Nigeria, a son, Robert Andrew.

SHANNON.—On September 7th, 1957, at Princess Elizabeth Hospital, Nairobi, to Julia, wife of David Shannon, B.SC., M.R.C.V.S., of the Veterinary Dept., Embu, Kenya, a son.

Marriage

BESWICK—BISSET.—On September 2nd, 1957, at the Memorial Chapel of the University of Glasgow, Walter Beswick, B.V.M.S., M.R.C.V.S., of 77, Norwich Road, Fakenham, Norfolk, and Hazel Bisset, D.A. (GLAS.), A.R.I.B.A., A.R.I.A.S., of 147, Balgrayhill, Glasgow.

COMING EVENTS

September

25th (Wed.). Meeting of the Midland Region of the British Small-Animals Veterinary Association at the White Lion Hotel, Banbury, Oxon, 2.30 p.m.

Meeting of the Lancashire Veterinary Association at the University Veterinary Hospital, Liverpool, 2.30 p.m.

General Meeting of the Society of Practising Veterinary Surgeons in the Devon School of Agriculture and Horticulture, Bicton, East Budleigh, 2.30 p.m.

27th (Fri.). Meeting of the North Wales Division at the Department of Agricultural Chemistry, School of Agriculture, U.C.N.W., Deiniol Road, Bangor, 2 p.m.

Meeting of the Shropshire Veterinary Club in the Mytton and Mermaid Hotel, Atcham, Nr. Shrewsbury, 8 p.m.

Autumn General Meeting of the North of England Veterinary Medical Association in the Agricultural Lecture Room, Kings College, Newcastle-upon-Tyne, 2.30 p.m.

October

2nd (Wed.). Meeting of the Welsh Branch of the B.V.A. at Aberystwyth, 2.15 p.m.

3rd (Tues.). General Meeting of the Central Veterinary Society at the Royal Veterinary College, Camden Town, N.W.1, 5.30 p.m.

Autumn Meeting of the North of Scotland Division in the Gordon Arms Hotel, Elgin, 2.30 p.m.

Meeting of the Lakeland Veterinary Association at the Shap Wells Hotel, Shap, 6 p.m.

9th (Wed.). Autumn Meeting of the Society of Women Veterinary Surgeons at the Veterinary Investigation Centre, Coley Park, Reading, 11.30 a.m.

10th (Thurs.). Ordinary Meeting of the Ayrshire Veterinary Association in the Ailsa Lounge, Station Hotel, Ayr, 2.30 p.m.

11th (Fri.). Annual Dinner and Dance of the Royal Counties Veterinary Association at the Randolph Hotel, Oxford, 7.30 p.m.

16th (Wed.). Meeting of the Section of Comparative Medicine, Royal Society of Medicine, at the Society's House, 5 p.m.

18th (Fri.). Annual Dinner Dance of the South Wales Division at the Seabank Hotel, Porthcawl.

23rd (Wed.). Meeting of the R.A.V.C. Division at the Royal Veterinary College, London, N.W.1, 2.15 p.m.

25th (Fri.). General Meeting of the Yorkshire Veterinary Society in the Hotel Metropole, Leeds.

BRITISH VETERINARY ASSOCIATION QUARTERLY MEETINGS IN LONDON

Wednesday, November 13th, at No. 7, Mansfield Street.

10.30 a.m. Small-Animals Committee.
2.00 p.m. Parliamentary and Public Relations Committee.
4.00 p.m. Home Appointments Committee.

Thursday, November 14th, at No. 7 Mansfield Street.

10.00 a.m. Veterinary State Medicine Committee.
11.30 a.m. Farm Livestock Committee.
12 noon Finance Sub-Committee.
2.15 p.m. General Purposes and Finance Committee.

Friday, November 15th, at the Connaught Rooms—
10.30 a.m. Meeting of Council.

FOOT-AND-MOUTH DISEASE

The area described in the schedule below is declared to be an Infected Area for the purpose of preventing the spread of foot-and-mouth disease:—

IN THE COUNTY OF DEVON

So much of the Borough of South Molton as lies to the north of the railway line running from Barnstaple to Bampton, excluding the said railway line.

In the Petty Sessional Division of Braunton: The parishes of Countisbury, Brendon, Lynton, Martinhoe, Parracombe, Arlington, Combe Martin, Challacombe, Trentishoe, Kentisbury, Berrynarbor, East Down, Loxhore, High Bray, Bratton Fleming and Stoke Rivers and so much of the parish of Swimbridge as lies to the north of the railway line running from Barnstaple to Bampton, excluding the said railway line.

In the Petty Sessional Division of South Molton: The parishes of Charles, East Buckland and Twitchen and so much of the parishes of West Buckland, Filleigh, North Molton, Bishop's Nympton, Molland, West Anstey and East Anstey as lies to the north of the railway line running from Barnstaple to Bampton, excluding the said railway line.

IN THE COUNTY OF SOMERSET

In the Petty Sessional Division of Dulverton: The parishes of Exmoor, Exford, Winsford and Withypoole, so much of the parishes of Dulverton and Brushford as lies to the north of the railway line running from Barnstaple to Bampton, excluding the said railway line, and so much of the parishes of Brompton Regis and Exton as lies to the west of the main road (A.396) running from Bampton to Dunster, excluding the said road.

In the Petty Sessional Division of Dunster: The parishes of Oare, Porlock, Selworthy, Minehead Without, Minehead, Luccombe and Wootton Courtney and so much of the parishes of Cutcombe and Timberscombe as lies to the north and west of the main road (A.396) running from Bampton to Dunster, excluding the said road.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Foot-and-Mouth Disease

Co. Durham. Portknowle Farm, Aislaby, Eaglescliffe, Stockton-on-Tees (Sept. 9).

Fowl Pest

Essex. Rosemary, Lodge Lane, Collier Row, Romford; Hillcrest, Lodge Lane, Collier Row, Romford (Sept. 7); Riverside, Lodge Lane, Collier Row, Romford (Sept. 9); Oak Lodge, Lodge Lane, Collier Row, Romford (Sept. 12).

Kent. 55, Harrow Road, Hempstead (Sept. 7).

Lancs. Ribblesdale Farm, Brook Lane, Little Hoole, Preston; Gills Farm, Much Hoole, Preston; Odd House Farm, Little Hoole, Preston (Sept. 7); Lowe Farm, Leyland Lane, Ulnes Walton, Preston (Sept. 9); Moor Hey, Little Hoole, Preston; Elm Bank, Hall Lane, Longton, Preston (Sept. 10); Kingsley, Lytham Road, Freckleton, Preston; Site No. 1, Naze Lane, Freckleton, Preston (Sept. 11).

Suffolk. Dial Farm, Haughley, Stowmarket (Sept. 6); Hill Farm, Haughley, Stowmarket (Sept. 10).

Swine Fever

Berkshire. Wormstall Estate, Wickham, Newbury (Sept. 6); Manor Farm Allotments, Reading (Sept. 13).

Cambs. Windmill House, Oakington (Sept. 13).

Ches. Dam Head Farm, Mobberley, Knutsford (Sept. 9).

Denbigh. Plas-yn-dre Dairies, Station Road, Llanrwst (Sept. 6); Cae Groes Farm, Nebo Road, Llanrwst (Sept. 10).

Dorset. Rectory Farm, Winterbourne Zelstone, Blandford Forum (Sept. 6).

Hants. Wildmoor Farm, Sherfield-on-Loddon, Basingstoke (Sept. 6); Arbour Cottage, Upham, Southampton (Sept. 11); 120, Roman Road, Worthing (Sept. 13).

Kent. Copt Hall, Shoreham, Sevenoaks (Sept. 6); Piggeries, Grovehurst Farm, Horsmonden, Tonbridge (Sept. 10).

Nottingham. Mill Farm, Blyth, Worksop (Sept. 9).

Oxon. New Leys Farm, Curbridge, Witney (Sept. 13).

Surrey. 36, Little Woodcote Estate, Wallington (Sept. 11).

Sussex. Monks Hill Farm, Sharpthorne, E. Grinstead (Sept. 13).

Warwicks. South Lodge Farm, Wolston (Sept. 13).

Wilts. Oak Tree Farm, Nomansland, Salisbury (Sept. 12).

Worcs. Hownings Farm, Hanbury, Droitwich (Sept. 11); Lower Temple, Laugherne, Lower Broadheath (Sept. 12); Bittell Farm, Alvechurch; Park Farm, Oddingley; Church Farm, Himbleton (Sept. 13).

Yorks. White House Farm, Holmfield (Sept. 9).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

A Scale of Professional Fees

Sir,—At a recent Council meeting of the Society of Practising Veterinary Surgeons the possibility of a thorough look at the economics of veterinary practice was discussed. It is hoped that it may be possible to hold a series of meetings at several widely separated places to go into this matter. The subject would, of course, also take account of fees chargeable to one's clients.

It may take some few months to collect the necessary data before a start can be made and it would be helpful if any veterinary surgeon in practice who has up-to-date costings of veterinary practice would kindly communicate with one of the undersigned.

Yours faithfully,

EDWARD WILKINSON,
President, Society of Practising Veterinary Surgeons.
Derby.

GEORGE M. G. OLIVER,
Secretary, Society of Practising Veterinary Surgeons.
Lanchester.

September 16th, 1957.

Knowledge of Euthanasia

Sir,—Major Hume's concern for the use of humane methods of euthanasia will no doubt echo that of the profession. That this principle is sometimes sacrificed in practice to considerations of economy or of safety of the operator may be admitted. While formal instruction in humane methods may be minimal this does not indicate any lack of importance of the matter but reflects the intelligent realisation that our outlook should be broadened by study and practice outside the narrow confines of a formal syllabus. In contradistinction to Major Hume's observation I would suggest that the underlying principles of humane euthanasia are properly considered in veterinary teaching and that the necessary practice is gained under extra mural tuition. At one university, at

least, a question on this topic has appeared quite recently in a degree examination.

Whatever the failings of the student he can, I am sure, be safely relied upon to appreciate the humanity and efficacy of the various methods of euthanasia. The methods he chooses to adopt in practice are then matters of conscience and not the concern of the planners of already overloaded veterinary courses.

Yours faithfully,
DONALD F. KELLY.

154, Wood Street,
Chelmsford,
Essex.

September 10th, 1957.

Sir,—I would like to support Mr. Hume in his suggestion that the subject of euthanasia should be included in the syllabus at the various veterinary colleges throughout the country. The humane destruction of awkward and vicious animals is a very real problem to the practising veterinary surgeon, particularly in the presence of the owner. A considerable amount of research is needed to find an answer likely to be satisfactory in most circumstances.

In addition, I would suggest that it would be a great help to the profession if the B.V.A. could interest a company in the production of an oil-fired smokeless and odourless incinerator such as one sees advertised in American journals. This I feel would be more satisfactory professionally than the varied means of disposal at present employed. It would also help to deal honestly with the client who is genuinely anxious as to the fate of his or her pet.

Yours faithfully,
HUGH D. CORYN.

"Moorcroft,"
Elm Tree Avenue,
Frinton on Sea.

September 14th, 1957.

Mucosal Disease Complex

Sir,—The current world-wide interest in the mucosal disease complex of cattle tempts us to draw attention to Montgomery's observation in Kenya on disease "C.H.," published in the Annual Report of the Veterinary Pathologist for the year 1914-15. Disease "C.H." resembled a very mild form of rinderpest. The symptoms were dullness, slight depression, a high temperature lasting for 3 to 4 days, a dark foetid diarrhoea which later changed to constipation, ocular discharge and inflammatory changes of the membranes of the mouth. Death from natural infection was not recorded. The aetiological agent was a virus which was bound to the blood corpuscles. Both rinderpest-susceptible and rinderpest-immune cattle contracted the disease on inoculation. Rinderpest-susceptible cattle which had recovered from "C.H." remained susceptible to rinderpest and were immune to "C.H." Calves reacted more severely than adults. Indian buffaloes reacted more severely than calves. Experimental infection of mules was inapparent but viraemia was present from the sixth to the 10th day after inoculation and 5 out of 43 infected mules died. Eland, horses, donkeys, and dogs were refractory. Contact transmission failed and Montgomery suggested that the natural disease was probably spread by ticks.

Yours faithfully,
R. D. BROWN,
G. R. SCOTT.

East African Veterinary Research Organisation,
Muguga,
Kenya.

June 20th, 1957.

Reference

MONTGOMERY, R. E. (1915). *Rep. Dep. Agric. B.E.A. 1914-15*. Pp. 142.

Broadcasts by Veterinary Surgeons

Sir,—I have just listened to a veterinary surgeon on "Woman's Hour"—many congratulations for this talk—let us have more.

It cannot be repeated too many times to the lay public what we have to do during the course of a "normal" day's work, what we have to do to qualify, and what advances we have made in the last few years.

Yours faithfully,
M. OVERTON.

"The Elms,"
34, Stourbridge Road,
Bromsgrove, Worcs.

September 4th, 1957.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
1st to 15th August, 1957		6	—	1	20	—	48
Corresponding period in	1956	11	—	36	40	—	30
	1955	12	1	—	8	—	46
	1954	11	—	—	8	—	58
1st January to 15th August, 1957		248	6	38	536	—	616
Corresponding period in	1956	1,074	8	49	428	—	501
	1955	484	3	6	379	—	1,010
	1954	182	3	12	575	—	1,027